Terminals Now Hot Item on Black Market

By Edith Holmes
CW Washington Bureau

WOODLAWN, Md — The Federal Bureau of Investigation is beginning to run into a sizable black market in portable computer terminals, according to David Miller, a special agent in the FBI s Philadelphia office

Texas Instruments, Inc. terminals seem to be the hottest items on the shelves of those who fence stolen goods, he told a recent gathering on computer security here sponsored by the Social Security Administration

The bureau knows little else about this black market, he added

Miller, who has a systems background and specializes in computer fraud, said the FBI encountered the terminal black market through conventional means of law enforcement Under the laws governing the interstate transportation of stolen property, the FBI got involved with several fences who ve started to talk to us about the trade in stolen terminals, he explained

We were startled to see terminals alongside the stolen liquor and television sets of the typical fencing operation, Miller said

Thinking about it now, I don t know why we were surprised – there s a black market for everything

Miller expects that, as CPUs get smaller and more compact, there will be a black market for computers as well

The FBI hopes to have some sense of the dimensions of this new black market in terminals within a year, Miller said Meanwhile, it is continuing to work with computer fraud cases and is finding the number of these cases has overwhelmed the re

(Continued on Page 8)

NEWSPAPER

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National Semiconductor System 400

370-Compatible System

National Semi Offers 'Mini'

By Jeffry Beeler
CW Staff

NEW YORK A hardware vendor joined the growing list of IBM 370 compatible medium scale systems suppliers when National Semiconductor Corp last week announced its first general purpose minicomputer to be sold directly to end users as well as to OEMs

Three weeks after National CSS Inc introduced its 370 compatible 3200 series superminis [CW April 17] National Semiconductor responded with its own medium scale system which reportedly runs unmodified DOS VS and VM/370 software but offers the same price and architecture as a typical upper end mini such as the Digital Equipment Corp PDP 11 70 or the Hewlett Packard Co 3000 series

In addition to providing compatibility with IBM operating systems and applications programs the System 400 comes with assorted adapters that permit interfacing both to IBM I/O devices and to five classes of minicomputer peripherals National Semiconductor spokesmen explained

This I/O capability coupled with the 370 software compatibility allows the System 400 which is said to be comparable in performance to the 370/115 to serve as a remote computing facility in 370 based distributed processing networks the company officials added

Service Arrangements

Initially National Semiconductor will service the system through its existing network of maintenance centers which currently supports the company s Datachecker point-of sale systems By June, the network will total 15 centers and the firm will establish additional System 400 service offices as the need arises, a company official predicted

Reportedly capable of executing instructions 1.5 times faster than a 370/138 the National Semiconductor mini incorporates 32 bit architecture with a central logic bus (CLB) that transfers data at up to

(Continued on Page 6)

For Public Utility Bills

Court Orders Human Tie

By Edith Holmes
CW Washington Bureau

WASHINGTON D C A U S Supreme Court decision here last week highlighted the need for continued human intervention in computerized billing schemes

The high court ruled in favor of Willie S and Mary Craft of Memphis Tenn who sued the City of Memphis Light Gas & Water Division in February 1974 after their utility service was cut off five times for nonpayment

The Crafts tried repeatedly to correct their billing problem caused in part by two sets of gas and electric meters serving the home they had just purchased which had once been a duplex However they could find no one at the utility who could unravel the difficulties reflected in the computerized final notice bills they continued to receive

In a 6 3 decision affirming the ruling of the U S Court of Appeals for the Sixth Circuit which granted the Crafts damages for the service terminations they experienced, the Supreme Court justices found the municipal utility at fault for failing to make a procedure available to its customers for challenging disputed bills

Under the due process clause of the 14th Amendment to the U S Constitution a municipal utility cannot terminate service at will but only for cause the two courts said

Due process requires that,

(Continued on Page 4)

DEC Makes DDP System Out of PDP

By Ronald A. Frank
CW Staff

MAYNARD, Mass Digital Equipment Corp has configured distributed data processing (DDP) versions of its PDP 11/34, PDP 11/60 and PDP 11/70 systems that include a newly introduced intelligent CRT called the VT62 as well as specialized software modules

Called the Trax systems the configurations are aimed at multiterminal dedicated net

(Continued on Page 6)

Portable Terminal Uses RF Link

By Ronald A. Frank
CW Staff

SCHAUMBURG, Ill Within the next few months a user with a radio-transmitting, hand held terminal could enter an instruction into a small keyboard and update a data base record in an IBM 370 CPU a mile away in real time

This scenario has become technically feasible with the introduction of a portable terminal system that combines FM business band radio with IBM 3270 binary synchronous data communications

The RDX 1000 from Motorola, Inc is a microprocessor based, hand-held terminal with a self contained, 53-key alphanumeric keyboard and display plus a two-watt FM transmitter and receiver

Two way communications between the RDX 1000 and an IBM mainframe is accomplished via two links according to a spokesman The terminal communicates in the UHF business band with an FM base station, the base station,

(Continued on Page 4)

Motorola RDX 1000

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Overreliance on DP — Not DP Errors — Blamed in Collapse of Civic Center Roof

By Howard A. Karlen
CW Staff

HARTFORD, Conn – The roof of this city's $31 million civic center collapsed under a load of wet snow last January because of basic errors in the original design, according to a computer analysis conducted by an academic committee investigating the incident

This finding was part of a preliminary report of the Mayor's Academic Task Force whose members blamed the problem in part on too much reliance on computers and not enough on common sense

Engineers tend to rely on computers too much," according to task force member Howard Epstein, an associate professor of civil engineering at the University of Connecticut at Storrs

There should be a lot of hand checking done in structures like this [space frame] because they're not the common ones People tend to accept anything the computer tells them, which is a very dangerous practice,' he said.

Like many engineers, the building's designers used a software package called Structural Design Language (Strudl) to assist in basic engineering calculations The mayor's committee used the same package to investigate the design

But, according to committee chairman Hayrettin Kardestuncer, also a professor of civil engineering at the university, all the designers had to do was to look at the data submitted to the computer and they could see the data was not right

They put garbage in and they did get garbage out, he added

Kardestuncer acknowledged that users occasionally find bugs in Strudl, which is updated annually by a user's group, but he said the bugs were not serious enough to have affected the calculations much

Faults Itemized

The preliminary report, which will be followed by a more detailed version expected from the committee soon and another by a New York consulting firm hired by the city, made the following points

- Both dead loads (the weight of materials used in construction) and live loads (e.g., snow) seem to have been underestimated.
- Buckling of the space frame's compression members appears to have been one of the major modes of failure. Bracing and the connection of interior members were inadequate.
- Struts used in adjusting the slope of the roof on the space frame appear to have contributed to the buckling of the structure.
- Building code provisions were not followed in the design of some of the tension members

Kardestuncer said his group reached these conclusions after reanalyzing the original data with a system known as Finite Elements Analysis (Finel) in addition to Strudl. The runs were made on the university's IBM 370/155.

Another area of concern mentioned in the report was the need for a double check on engineering calculations

At present, standard engineering and architectural practice is that a licensed professional engineer must certify the calculations, a provision for an independent check on such calculations is not a part of many construction codes

Epstein said he plans to mention this need before the appropriate professional groups. Commenting on double checking by the city of Hartford, Kardestuncer said the additional cost of engaging an independent consultant would have been insignificant. "After all," he said, "this was not a coop that was going to house 10,000 chickens.

Babson Honors DEC's Olsen

WELLESLEY, Mass – Babson College's newly created Academy of Distinguished Entrepreneurs honored five entrepreneurs including Kenneth H Olsen, president of Digital Equipment Corp , as part of the college's Founder's Day ceremonies held here recently

According to Babson's president, Ralph Z Sorenson, the academy was established "to pay public honor to a representative group of entrepreneurs who, through their ability to create, take risks and build, have contributed significantly to the well-being of the economy and society

Clarification

Shop Floor Terminals Ease Production for Truck Maker [CW, April 24] was not meant to give the impression that terminals made by IBM and Panasonic Corp were incompatible with the Xerox Sigma 7 mainframe

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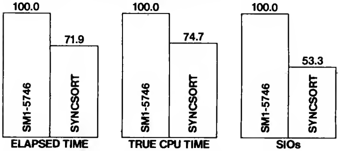
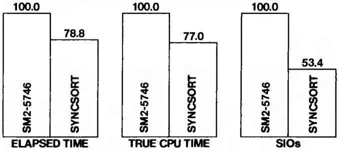
We are, of course, somewhat nutty on the subject of benchmarks. And most of our users prefer to test SyncSort before they sign on the dotted line. Here are the results of 42 recent benchmarks, covering 213 files, that compare SyncSort's use of computer resources to that of IBM's two "top-of-the-line" sorts:

SyncSort DOS vs. IBM's SM1-5746.



SyncSort DOS vs. IBM's SM2-5746.



How did SyncSort do against IBM's other two "paid-for" sorts. Even better. And as for SyncSort's performance against old SM-483, IBM's "free sort," we can only remind you that the most expensive luxury in the world is a piece of free software!

Another interesting piece of information came out of these tests. We discovered that IBM's DOS sorts perform almost *exactly* the same as their OS sorts. Which is to say, somewhat lackadaisically.

And that may be the real moral of this piece. If you're about to propose to a new DOS sort, maybe you'd better meet the rest of the family first!

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At Annual Meeting

IBM Stockholders Defeat Human Rights Move

By **Marcia Blumenthal**
CW Staff

DENVER — For the fifth year in a row, IBM stockholders at the recent annual meeting defeated church-supported resolutions on the use of the firm's products in repressive countries.

However, the number of abstentions on the vote gave supporters hope that their campaign was having some effect.

Among other meeting topics, the firm announced that its backlog was running at record levels and blasted the Department of Justice for its handling of the massive antitrust suit against the firm.

In the motion on repression, sponsored by the Interfaith Center on Corporate Responsibility, stockholders supported management with a 97% to 3% vote, but abstentions amounted to six million shares, according to Dr Howard Schomer of the center.

While such resolutions in the past have dealt only with the firm's relations with South Africa, this year the center — a coordinating committee composed of national Protestant organizations and 150 local and regional Catholic groups — introduced a more general proposal urging shareholders to get IBM to develop clear criteria and a program to ensure that its products are not used in abridging human rights.

Investigations Recommended

The proposal also recommended that IBM initiate investigations into the uses of its computers in Argentina, Chile, Brazil and Uruguay, countries identified as using IBM computers for repressive purposes.

Schomer said the six million abstentions were "motivated abstentions" and interpreted that silence as an indication to IBM management that there is a real problem in the area of human rights.

This year's proposal was fueled by IBM President Frank T. Cary's statement at the 1977 stockholders' meeting that IBM would not knowingly bid for any business involving repressive activities.

In essence, the interfaith group was pressing IBM to act on that statement of corporate principle, Schomer said.

On April 11, in preparation for the annual meeting, leaders of the group met with top IBM executives including Cary.

At that time, Schomer's group asked IBM management to define repression and to show them the standard operating guidelines the company uses to evaluate whether potential customers will use computers for repressive purposes.

IBM executives have been unable to develop an acceptable definition of repression, arguing they would have to rule out doing business with nearly 100 governments, according to Schomer, who pointed out that Cary later admitted this impasse to the stockholders during the annual meeting.

In addition, Schomer contended, IBM reported it investigated the four countries named in the resolution and found the accusations were not corroborated.

At the same April 11 meeting, the interfaith group asked IBM's management to outline the categories of business refused in keeping with the stated commitment of the corporation. Schomer said IBM responded that it has not yet refused any business.

Largest Backlog Ever

In other statements at the annual meeting, the firm said it had the largest backlog of orders in its history and will add up to 10,000 personnel to handle the load.

All plants are being worked on a three-shift-a-day basis, Cary reported.

In his strongest public statement yet on the antitrust case against the firm, Cary claimed the firm had not been dragging its feet on the trial and placed the blame for the delays squarely with the Department of Justice.

"Despite IBM's repeatedly announced readiness to go to trial, the antitrust division asked for delays — twice in 1972, twice in 1974 — and then in 1975 it amended its complaint to include some totally new charges," he said.

Furthermore, he said IBM attorneys would present the firm's side of the case as "crisply and expeditiously as possible.

"We have always been opposed to delays," Cary added. "We believe we are right. We want to get this over with."

Portable Terminal Uses Radio Link to 370

(Continued from Page 1)

in turn, interfaces to an RDX 1100 control unit that transmits data to the mainframe over a conventional data communications link.

The portable terminal is compatible with IBM 3270 CRT protocol. Editing controls similar to those on the 3270 can be initiated by the RDX 1000's operator.

The terminal includes a 480-character memory and data is shown on a 16-character LED display.

Transmission between the RDX 1000 and the RDX 1100 control unit is in Ascii code. The minimum transmission rate over the radio frequency (RF) channel is 1,200 bit/sec or 80 char./sec, Motorola said.

Data transmitted between the RDX 1100 control unit and the CPU at speeds of 1,200- to 9,600 bit/sec can be coded in either Ascii or Ebcdic. The control unit can be connected with conventional modems using a standard RS-232 interface, the spokesman noted.

Teleprocessing Support

IBM teleprocessing software support for the RDX terminal system includes Btam, Tcam and Vtam. These can be used with 360 and 370 systems running under CICS, IMS, TSO and Video 370, Motorola said.

The CPU controls communications through polling or selection of terminals operating in the system. Terminal identification resides in a table lookup in the RDX control unit.

Polling and selection sequence response activity between the CPU and the control unit is similar to that of a remote 3270, according to Motorola.

When interfaced to the appropriate base station, the control unit is said to support up to 32 RDX 1000 terminals in a multidrop configuration. An error detection/correction scheme is utilized on the channel to minimize message retransmission, the firm added.

An optional voice communications capability on the portable terminal reportedly allows the terminal operator to page other terminals in the system.

The distance over which the terminal can communicate with the base station depends on normal FM propagation characteristics, the spokesman noted, adding it typically can range between 100 feet and two line-of-sight miles.

The terminal can be equipped with a light pen that reads Code 39, an alphanumeric bar code used in industrial environments.

A data-only version of the RDX 1000 costs $3,600 while the data/voice unit costs $3,750. The FM base station is priced at $4,500 and the RDX 1100 control unit costs $19,800.

First deliveries of the RDX system are scheduled for late this year. Motorola's Communications Division is at 1301 Algonquin Road, Schaumburg, Ill. 60196.

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Court Orders Human Link

(Continued from Page 1)

at a minimum, the utility provide its customers with an opportunity to present their cases to "designated personnel empowered to rectify" errors in charges for services. In the case of the Crafts, the courts found, no one at the utility provided this kind of assistance.

The ruling does not apply to private utility firms, the court said.

While the Supreme Court emphasized the need for a human interface between the utility's computerized billing system and its customers, the justices also suggested that customers have a responsibility to try to resolve billing problems.

Originally, the Crafts along with several other customers of the utility, filed this case in a district court proceeding. The district court decided that out of all those suing the utility, only Mary Craft had "sought in good faith to determine the cause of the 'double billing.' "

By the time the case reached the Supreme Court, only the Crafts remained in the suit against the utility company's president and general manager, vice-president, members of the board of commissioners and two employees who had responsibility for terminating utility services.

Mary Craft missed work on several occasions to go to the utility's offices to resolve the "double billing" problem. The Crafts also had called in a private plumber to combine their two meters into one after learning from the utility company's meter reader that both sets of meters were running in their home.

Unfortunately for the Crafts, the plumber did not consolidate the meters properly, and they continued to receive two monthly utility bills until January 1974.

Since the initial decision by the district court in the utility company's favor, Memphis Light, Gas & Water has changed its complaint and error procedures. With every computerized "final notice," customers are informed that "credit counselors" are available to talk with them about billing problems, and they are given a phone number to call, a spokeswoman for the utility said.

Ontario Ends Software Centralization Effort

By Brad Schultz
CW Staff

TORONTO — After a five-year experiment with centralized computer services, the Canadian province of Ontario has dissolved its central software group and is returning to decentralized software development.

However, the Ontario Ministry of Government Services is retaining the group's hardware counterpart.

The Ministry's Systems Development Services (SDS) Division was disbanded last month and the bulk of its staff transferred to other provincial agencies. Since its creation, SDS had lost an estimated $2 million.

In contrast, the allocation and support of hardware resources continue to be profitably managed by the Computer Services (CS) Division.

The divisions were formed on a competitive basis with private industry when the centralization program was inaugurated in 1973. The program was intended to optimize the consumption of both hardware and software resources by the Ontario government, according to Bernard Webber, management technology director for Ontario's Management Board. Webber played a key role in administering the program.

SDS was largely staffed with software specialists from Ontario government bodies, all but eliminating those bodies' DP units. Agencies therefore had to contract either with SDS or private firms to meet their software needs.

Committee Recommendations

The consolidation effort was carried out in compliance with the 1971-1972 recommendations of an advisory group of academic, civic and business leaders called the Committee on Government Productivity. The committee urged the government to centralize to prevent underutilization of DP resources in some agencies when other agencies were experiencing a shortage of resources.

The committee concluded that government bodies build DP staffs to meet the demands of projects under way, but when projects phase down and no other work is available for those specialists, rather superfluous tasks are invented to prevent their idleness.

Bringing an end to centralized software development and terminating the division was not entirely at odds with the committee's recommendations, Webber said. The committee had proposed that the centralized scheme's progress be closely monitored on a profit-and-loss basis and that the government be prepared to take corrective action should things not work out.

The policy switch has induced most SDS people to take positions with agencies that had been SDS clients. However, most of them are not returning to the same jobs they had before joining SDS because of the way demand has changed throughout the provincial government, Webber said.

Reason for Failure

Explaining SDS' negative performance, Webber said many programmers who joined SDS when the division was established came from agencies where they had successfully completed projects and no meaningful work remained for them.

For this reason, SDS had difficulty in finding client agencies to hire SDS personnel. A programmer could not expect the agency he had just left for lack of work to hire him back as a consultant, although his skills and experience might be tuned to that agency's requirements more than any other.

"A majority of ministries in the government transferred all but one or two people to the central agency, and the government allowed each ministry to keep sufficient resources so that it could manage the flow of projects...to supervise [their] ongoing progress . . . and thus report in a responsible way to their own ministry management," Webber noted.

"In the larger ministries, those necessary resources were judged to be much larger than one or two people, and some of the ministries perhaps kept 15% or 20% of [their DP] staff members, transferring something like 80% to the central agency rather than 98%," he continued.

Webber mentioned another factor in the division's disappointing performance: "The government budgetary system perhaps was a bit restrictive for this kind of an agency to exist.

"A government manager, if he is a little uncertain as to the level of his resources in a given year, will wait until the latter part of the year before he undertakes some of the discretionary projects."

For this reason, a "central systems agency might have people lying idle the first part of the year and then have a demand for twice as many people in the last four months of the year."

This situation impaired SDS' ability to compete with the private sector, he said, because the latter can adapt more easily to fluctuations in demand.

Before centralizing DP services, the top management of a government structure — typically at the deputy secretary level — should undertake a careful, comprehensive study of the personnel, agency requirements and other aspects, Webber advised.

"This review should include an in-depth look at the experiences of other government agencies that have tried to do this kind of thing," he suggested. The review should examine what went wrong in other places "and then make the judgment that best fits the environment at hand."

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More Action on Sharansky Demanded by NAS Members

WASHINGTON, D.C. — Members of the National Academy of Sciences (NAS) have expressed dissatisfaction with Soviet officials and indicated they want further action by NAS authorities in regard to the Anatole Sharansky case.

The call for action was made in a resolution passed at a business meeting here recently in which NAS members said they were dismayed at the "lack of Soviet response to NAS initiatives on behalf of Soviet scientists denied their human rights." The resolution was directed to the NAS governing council.

Members were referring to the lack of response to inquiries made by the NAS Committee on Human Rights on behalf of Sharansky, a Soviet computer scientist, as well as research biologist Sergei A. Kovalev and high energy physicist Yuriy F. Orlov. The committee has sent official letters to various Soviet political authorities, including President Leonid Brezhnev, asking for information and the release of the dissidents. It has received no replies.

NAS President Philip Handler also has received no response to his request to send legal observers to Sharansky's pending trial. Sharansky has been imprisoned more than a year, charged with espionage. [CW, Feb. 20] No date has been set for his trial.

The NAS resolution was made to prompt further action at the next council meeting, which is scheduled to take place at the end of June.

DEC Turns PDP Into DDP With Help of VT62 CRT

(Continued from Page 1)

works involved in interactive transaction-processing applications.

The VT62 is a microprocessor-based CRT with 8K words of buffer storage that is downline-loadable from the PDP processor. With the Application Terminal Language (ATL), a user can store in the CRT buffer up to 64 application-specific messages along with the basic forms definition.

Applications are written in either Cobol or Basic Plus 2, a spokesman noted.

The terminal transmits data in blocks rather than character by character, making more efficient use of lines and CPU resources, DEC said. With its built-in intelligence, the CRT can utilize different forms based on a common software program.

For example, the spokesman explained, different VT62 CRTs could have screen formats in differing languages even though each language implementation would be based on a single program.

The Trax systems operate under Decnet for communication with other Trax systems. An IBM 3271 emulation protocol is available so a Trax system can interface with an IBM mainframe utilizing 3270 Binary Synchronous Communications, according to the spokesman.

For Near-Novices

The terminal was designed for use by operators who do not have detailed DP experience. The forms-oriented makeup can guide users through transactions with "menu selection and function keys that avoid use of conventional computer commands," DEC said.

Local intelligence at the terminal provides detection of keying errors. User messages are displayed in a separate screen area away from applications data, the company said.

Trax systems can operate at speeds from 300- to 9,600 bit/sec on either dial-up or private-line facilities, and multidrop nets can be configured. The Trax operating system software includes features for high availability and security, DEC claimed.

For users with installed DEC systems, the PDP-11/34, PDP-11/60 and the PDP-11/70 can be upgraded in the field. This requires the addition of the Trax operating system together with the necessary software modules and a required number of VT62 CRTs.

Internet Communications

Under the announced Decnet support, a Trax terminal in one system can communicate with a terminal in another Trax system using a Transaction Step Task (TST) feature under the ATL form. In such an operation, a terminal invokes a subroutine called TST Spawn to access TST in another system which, in turn, connects the calling terminal to the called terminal, the spokesman said.

In most cases, this operation is transparent to the terminal operator, he added.

Many of the local editing operations and the instructional routines to guide the terminal operator are controlled by the local microprocessor without interaction with the PDP-11, the company said.

Trax supports up to 16 "simultaneously active" terminals on the PDP-11/34 and up to 64 terminals on the PDP-11/70. A typical PDP-11/34 with Trax software, eight VT62 CRTs, 256K bytes of memory, 56M bytes of disk and a 9-track tape drive is priced at $131,840.

A PDP-11/70 with 20 terminals, 384M bytes of storage, 134M bytes of disk and a tape drive costs $211,420.

Prices for other configurations, including the field upgrade of installed PDP-1s, were not available. First deliveries are scheduled for July.

Correction

The tornado shown in the April 17 front-page photo occurred in 1975, not 1977.

National Semi Has 370-Compatible Mini

(Continued from Page 1)

20M byte/sec, the firm reported.

In a minimum configuration, four systems elements attach to the CLB — a 256K-byte main memory and three processors , consisting of an instruction processing unit (IPU), a dual I/O processor (IOP) and a service processor, the spokesman said.

All three types of processors are microprogrammed and come with writable control storage based on static MOS random-access memory (RAM), they said.

The IPU is said to emulate the 370 instruction set and provides a 32K-byte writable control storage expandable to 256K bytes. Based on a 32-bit National Semiconductor IDM2901A microcomputer, the IPU comes with address translation, clock, CPU timer, clock comparator and 370 user-accessible registers, the officials said.

The IOP also incorporates an IDM2901A and provides 16K bytes of writable control storage expandable to 256K bytes, the noted. Designed to control peripherals and execute 370 channel programs, the IOP reportedly oversees an 8-bit, asynchronous front-end I/O bus that transfers data at up to 1.5M byte/sec.

Unlike the system's other CPUs, the service processor uses an 8-bit National Semi Series 80 microprocessor to emulate 370 console functions and to perform system diagnostic and control functions, the company said.

Equipped with a standard 48K-byte control storage, the unit supports a diskette drive that loads microprograms for all three processors as well as for the system's console and diagnostic communications adapter, it added.

Main memory, meanwhile, is said to consist of 16K-byte MOS RAMs, and 256K bytes can fit on one printed circuit board.

Expandable to 12 IOPs

In a maximum configuration, a System 400 expands in 256K-byte increments to 16M bytes and incorporates up to 12 IOPs, a spokesman noted.

Each IOP can interface to peripherals — without software modifications — either by using standard IBM channel protocols or the System 400's integrated peripheral adapters (IPAs), he said.

With an IBM channel-to-control unit interface adapter, the System 400 emulates 370 I/O channels including byte multiplexers, block multiplexers and selectors, National Semi explained. The adapter also allows the system to accept any standard IBM controller and associated devices, a spokesman said.

With the IPAs, meanwhile, users can reportedly attach the following National Semi or OEM peripherals to the system:

- 200M-byte disk drives emulating the IBM 3330-11.
- 800 and 1,600 bit/in. tape drives emulating the 3420 series.
- A line printer emulating the 1403 or 3203.
- A card reader/punch emulating the 3505/3525.
- A diskette unit emulating the 3540.

As many as eight IPAs can attach to one IOP, the firm said.

Communications Adapters

Users can also attach terminals to the system through integrated communications adapters that attach to the IOP and support eight asynchronous or bisynchronous lines transmitting up to 9,600 bit/sec, the spokesmen reported. With the adapters, the IOP can support as many as 64 communications lines, they said.

Because of its compatibility with 370 software, the System 400 accommodates Assembler, Cobol, RPG-II, PL/I, Fortran, Basic, Algol, APL, Pascal, CICS, Video 370, Script 370 and VSPC plus assorted editors, loaders, libraries and debuggers.

Packaged in 15-in. by 17-in. printed circuit boards, the System 400 modules plug into one or more standard 28-slot backplanes, the officials said. Cards containing the system's electronics reportedly mount in a standard 19-in. rack.

System Price

A basic System 400 configuration costs $165,000 and cosists of an IPU, two IOPs, a service processor, 256K-byte main memory, system console, 200M-byte disk drive unit with adapter, 75 in./sec tape drive unit with adapter and eight communications lines with adapter.

Shipments of the system will begin during the first quarter of next year from National Semiconductor at 2900 Semiconductor Drive, Santa Clara, Calif. 95051.

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House to Say When DP Gives Campaign Edge

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — The House Administration Committee is expected to begin working on a policy to govern congressmen's use of computers and franked (free) mail to manipulate the voters back home.

The use of computers and computer services paid for with taxpayers dollars has become an issue in this election year [CW, April 3]. Many have contended that the mailing lists and information on voters contained in the memory banks of these systems provide incumbents with an unfair advantage over political opponents.

The House Administration Committee's Policy Group on Information and Computers, consisting of Representatives Charlie Rose (D-N.C.), Edward W. Pattison (D-N.Y.) and Dave Stockman (R-Mich.), agreed last week to propose an amendment to the rules by which House members must live that would tie their use of computing power to franked mail. The name or address can't go on an envelope unless the piece of mail bears a congressman's frank, according to a Computer Policy Group staff member.

The members of the House understand the rules governing the franking privilege, he explained. Congressmen seeking reelection can't use their free mail allowance in their campaigns.

While the proposed rule is clear, the dividing line between official business and campaign purposes remains blurred.

Washington Update

Funding 'Indigestion' Welcomed by NBS

Seventy percent of the National Bureau of Standard (NBS) budget request for fiscal year 1979 is slated to go to its Institute of Computer Science and Technology efforts to help the federal government "get all the mileage out of [computer system] standardization that it can," according to Dr. Jordan J. Baruch, assistant secretary for science and technology within the Department of Commerce.

The $13.4 million increase the NBS is asking Congress to appropriate for the development of standards on high-level languages, software quality control and network interfaces [CW, Feb. 27] is only 2% of the increase warranted in this area, Baruch told the Senate Subcommittee on Science, Technology and Space at a recent hearing.

Sen. Adlai E. Stevenson (D-Ill.), who chaired the NBS oversight hearing, expressed his concern that the almost 25% increase in the NBS' overall budget would give the bureau "financial indigestion."

Baruch readily agreed the Institute of Computer Science and Technology might have trouble swallowing such a a large budget increase in its present organizational form. "But we think that if we have enough money, we will be able to staff and organize the institute so it can do the job," he asserted.

Two additional witnesses — Dr. W. Dale Compton, vice-president of research for Ford Motor Co., and Dr. William O. Baker, president of Bell Laboratories — supported the bureau's budget request for its computer institute and added that, ultimately, even that won't be enough.

Baker called interface standards the most serious work facing the institute. He maintained that the lack of such standards has led to "fragmented systems development all over the nation."

Geller Hearing Termed a 'Lovefest'

Henry Geller's Senate confirmation hearing here recently was nothing short of "a lovefest," observers agreed. Appearing before the Senate Commerce Committee's Subcommittee on Communications some six months after his name first surfaced as President Carter's choice for the new job of Assistant Secretary of Commerce for Communications and Information, Geller was questioned by a senator who called him by his first name and otherwise provided all the welcome from Congress that he could want.

Sen. Ernest F. Hollings (D-S.C.) has fought even longer than Geller for a strong administrative focus on communications and information policy development. Hollings suggested that the purpose of the hearings was to find out what powers were left to Geller by the executive order that abolished the White House Office of Telecommunications Policy (OTP) and created the National Telecommunications and Information Administration (NTIA) in the Commerce Department [CW, March 27].

Geller argued that the merger was "more than an alphabetical game. The new entity is more than the sum of its parts."

But while NTIA may well represent the first time the executive branch has placed a proper focus on basic telecommunications and information policy issues, Geller acknowledged the new agency can only recommend actions to Congress.

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HEW System Screens Student Loan Requests

By Ann Dooley
CW Staff

WASHINGTON, D.C. — More than one-fourth of the students applying for certain federal education grants so far this year have supplied inaccurate information and have been rejected by a computer programmed to find such errors.

Used for the first time this year, the computer edit system checks for discrepancies or omissions on applications to the Basic Educational Opportunity Grant program. The system has so far "flunked" 200,000 of the first 800,000 applicants.

The Basic Educational Opportunity Grant program is aimed at providing funds for students who may wish to attend colleges or vocational or technical schools.

Some of the student's mistakes occur through honest error or oversight, according to Leo Kornfield, director of the Department of Health, Educational and Welfare (HEW) student aid program, but others cheat by underestimating their family income in hopes of getting a larger grant, he said.

Students who are rejected can submit a corrected application but these are carefully examined to ensure accuracy, Kornfeld said.

In order to receive a grant, a student must fill out a form describing family income, family size, total number of siblings in school, taxes paid and other pertinent financial data.

The system analyzes all the information and is programmed to kick out any application that is inconsistent, according to Kornfeld.

If a student is eligible for a federal grant, the system analyzes the family's financial situation to determine how much it can pay and how large the grant should be, he explained.

$100 Million Savings Expected

Previously, the grant program had no effective method of checking the accuracy or honesty of its applicants. The department would examine a random sample of applications for inconsistencies or errors but would not be able to complete the manual check before the awards were made, he said.

By weeding out applicants who are ineligible or who would otherwise receive too large a grant, the system is expected to save at least $100 million to $150 million annually.

Theoretically, once students are made aware they can't succeed at cheating, they will provide more complete and honest information, Kornfeld said.

This is a more accurate system that will give a student a fair grant based on need, he noted, adding that last year, four million students applied and two million received some grant money.

The department decided to install a preventive maintenance system for an already good program administering funds for those who need help to attend school, he said.

Similar to IRS System

The HEW edit system is similar to that of the Internal Revenue Service, (IRS), but there is no cross-checking with that agency, Kornfeld stated.

Security is very tight, he added. Every applicant has a coded user number and each department has access to only a certain amount of information.

There are 10 regional offices around the country for loan pay-back purposes, but they don't have access to any personal financial data, he added.

Since the program is so new, information is still being gathered on what types of mistakes are being made in grant applications. If many similar mistakes are occurring, the application form may be changed, he said. But many of the students rejected by the system don't deserve a grant at all, he noted.

In addition to catching applications with errors, the department will also perform an audit on 10% of those students considered eligible for aid. Special emphasis will be placed on those who resubmitted corrected applications. Many of the students resubmit a corrected application solely in order to try to obtain a larger grant allotment, he noted.

The student aid department's grant, loan and work-study programs are all computerized to some extent, Kornfeld noted.

The loan program system keeps track of billing records and procedures once a student is eligible to start paying back the loan, he explained. The work-study system is programmed to calculate job allocations to educational institutions, he said.

All program work is contracted to outside companies on a competitive bid basis, Kornfeld added.

The department is also nearly in production mode for a computer system used to track down student-loan defaulters and start billing procedures, he added.

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Terminals Hot On Black Mart

(Continued from Page 1)

sources it can devote to them.

Computer fraud is definitely on the increase and "is becoming more and more sophisticated," the special agent stated.

Organized crime has not moved into computer fraud as far as the FBI can tell, however, he added. Computer crimes are usually committed by two or three technical people within the victimized organization.

Miller looks forward to the passage of Sen. Abraham Ribicoff's (D-Conn) computer crime bill, introduced in the Senate nearly a year ago, because he believes it will define for people in industry the line between a computer prank and a criminal act.

No employer would file suit against a programmer who programs the system to print out a picture of Snoopy or the Mona Lisa, for example. But the boundary between criminal intent and innocent use of the computer system begins to get fuzzy, Miller pointed out, when an employer permits a programmer to calculate his income taxes on the system and the programmer turns around and offers the same service to the neighbors on his block for a fee.

"There are some judges and attorneys who contend we need laws that apply specifically to computer abuse," Miller said, noting most computer criminals are convicted under such laws as the mail fraud statues. Others, however, say new laws aren't necessary because computers have permeated every aspect of life today.

"Bank larceny is still bank larceny regardless of whether a computer is used to commit the fraud," he said.

Employers Polled

DP Graduates Lack Business Savvy: Survey

By Nancy French
CW Staff

SAN MARCOS, Texas — Most university computer science programs are not producing graduates with the expertise needed in the commercial DP environment.

Furthermore, most graduates of such programs lack the ability to apply DP in areas that aid in decision making, operations control and forecasting for future growth, according to a report published here recently.

The findings were released by three professors in the Department of Accounting and Computer Science at Southwest Texas State University and were based on 486 responses to a questionnaire sent to 1,200 companies using computers.

The professors concluded that if one programming language is emphasized over another, it probably should be Cobol. They said systems design, flowcharting, documentation, file design and information retrieval should be emphasized at least as much as, if not more than, programming. In addition, undergraduate business education should be stressed as a second area of study, since survey respondents reported that computer science graduates need more familiarization with accounting and general business procedures.

The survey team included Prof. Marvin A. Johnston and assistant professors James R. Cook and Michael C. Gallagher.

Programming Languages

In the area of programming languages, about 47% of those responding to the survey said their applications are programmed in Cobol and approximately 79% reported having Cobol compilers. Utilization of PL/I was found to be almost "nonexistent" and Fortran was used for approximately 10% of applications. "Yet Fortran has been strongly emphasized by most educational institutions for a number of years, dating back to the early 1960s, when it was the dominant computer language," the report said.

Seventeen percent of those responding reported using RPG, which the professors found "not surprising" since there are thousands of minicomputers in use and RPG is one of the primary languages on minis.

The professors found the results on Assembly language coding "interesting," because although Assembly was said to be in use for only about 14% of applications, it is being used by 59% of all installations.

The report pointed out, however, that Assembly is used for special purposes such as systems programming and teleprocessing control programs and as such "it is a very important language.

In the language category entitled "other," most respondents mentioned languages associated with particular manufacturers, such as NCR Corp.'s Neat/3.

Basic was the one exception, the report said. A relatively simple language not tied to any particular vendor, Basic is taught generally as a "first computer language" for beginning students rather than as a language with long-term applicability in the business world, the report indicated.

The second area of investigation was computer utilization. Respondents indicated that 86% of computer applications are commercial in nature compared with only 14% scientific. About 96% of all installations surveyed were involved in at least some commercial applications.

Preparation for commercial DP is sorely neglected in the college curriculum, the researchers noted in their report, with very few educational institutions offering complete degree programs in business-oriented computer science. At most, Fortran, Cobol and an introduction to DP are offered — yet industry wants business training for the graduates it hires.

The third area of investigation was major techniques and concepts. Systems design was rated most important, followed by file design and information retrieval. Flowcharting and documentation came next with programming, fifth. Ranked last in importance were computer-based information systems theory, statistics and operations research.

The fourth area of investigation dealt with sources of education for computer science personnel currently working in industry.

The report said 63% of all employees were educated in four-year colleges or through company training programs. The remaining 37% was fairly evenly split among trade schools, junior colleges, vendor training and "other." In "other" the most frequently mentioned source was military training, the report said.

The final area of investigation concerned the importance of bachelor's and master's degrees in working as a computer specialist.

On a scale of one to five, with one being most important, the mean rating for a master's degree was 3.54 and for a bachelor's, 2.31.

The report's authors can be reached at the Department of Accounting and Computer Science, Southwest Texas State University, San Marcos, Texas 78666.

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Utica Schools Open Up Job Placement Service

By Marguerite Zientara
CW Staff

UTICA, Mich. — The Utica Community School System, which has been using computerized information for three years to help its students find jobs, recently began offering the same service to the community at large.

Since the Vocational Identified Placement (VIP) service began in March, more than 160 area residents have obtained jobs through the service, according to Earl J. Phillips, director of vocational education for the school system and initiator and director of the placement service.

The school system has been using the General Information Survey (GIS), a computerized test that helps determine occupational interests, since 1975. GIS is leased from Tymshare Corp. for $1,000 per year and is used by all the high schools in 21 school districts in the Utica area, Phillips said.

When the service "went public," it added another computerized test, the Michigan Occupational Interest Survey (MOIS), developed by a Michigan State University professor and furnished to the school system free under a State of Michigan grant.

Interests Determined

Both tests determine such interests as whether a person prefers working inside or outside, with people or alone and whether he enjoys manual labor. When a person's preferences have been determined, that information is keyed into one of two Digital Equipment Corp. Decwriter IIs, which then outputs different occupations that could fill those interests.

The various occupations that interest a person can be keyed in and the system will indicate how much they pay, where and how many jobs are available, what training is necessary for the jobs, how many students attend the training schools and the cost of an educational program. The GIS furnishes this information on a national scale and the MOIS covers statewide opportunities, Phillips noted.

Both systems output an Occupational Information File, a four-year college file, a two-year college file, a scholarship and financial aid information file and a supplemental list of other specialized fields of interest.

'Good for Everybody'

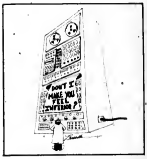
"It's very fascinating for a student to do this. You talk to the machine, it talks back. It's good for everybody," Phillips said. A person with two or three interests might come away with eight feet of computer printout paper, he said.

The service is free of charge to anyone of any age within the school system area. The data base, which is furnished by the developers of the tests, is updated every year.

If there is a surplus of jobs or trained applicants at any time, Phillips said, he advertises in the local newspapers to try to match people with jobs. Phillips hopes to have a computerized listing of applicants and potential employers within a year so users can access the information themselves.

The service is funded through the State of Michigan's "added cost" vocational funding program, under which the state furnishes the additional cost over regular classroom training to train students for available jobs.

About 65% of residents using the service are students or recent graduates and the rest are over 25 years of age.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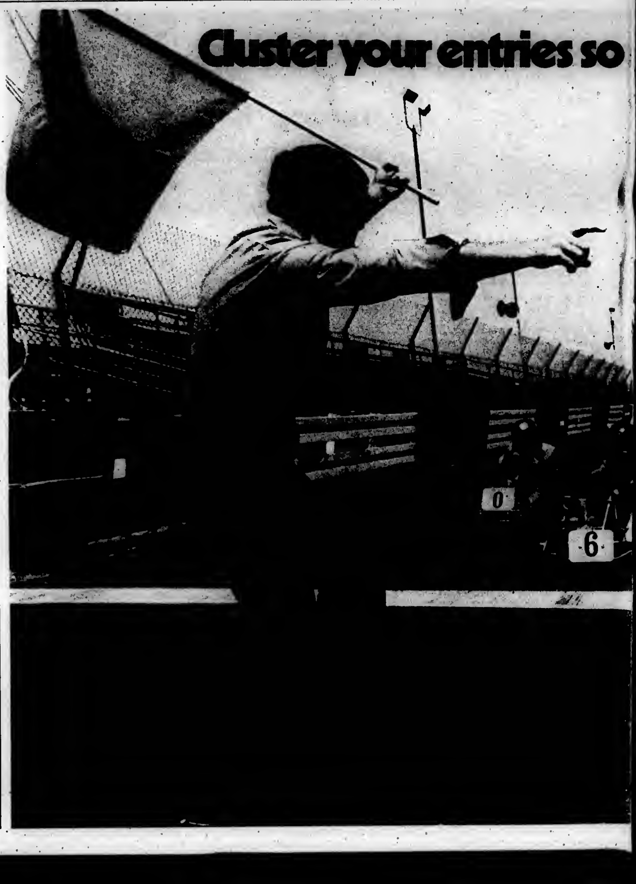

Depreciation Techniques Misapplied

Appraisers: 90% of DP Sites Wrongly Insured

By Howard A. Karten
CW Staff

BOSTON — More than 90% of the computer installations in the country are incorrectly insured, according to a recent study made by the American Computer Appraisal Service (Acas) here. Four billion dollars worth of hardware is overinsured, according to the study, while $2 billion is underinsured.

The reason: Businesses are unaware of the true state of the market and/or are misapplying conventional depreciation techniques, according to S. Paul Blumenthal, manager of the service.

Conventional depreciation techniques, derived from formulas used to depreciate equipment for tax purposes are not as accurate for computer equipment as they are for other capital equipment, Blumenthal said, mainly because of the rapid rate of technological change.

For example, using the original cost method to evaluate an IBM 370/168-3 a user would come up with a figure 33% higher than its current market value because buyers now want to purchase 3033s instead of 168s.

In contrast, the book value of a 370/155 is approximately 50% less than its current fair market value. An owner of one of these machines could lose close to $300,000 in the event of a disaster, Acas said.

Compounding the problem is that different pieces of equipment depreciate at different rates. For example, a CRT that uses technology with a high rate of change will drop much faster in value than a medium-speed line printer, which is a staple.

The result of this situation, according to Acas, is that CRTs are consistently overinsured while printers are underinsured.

Acas, a divison of the American Used Computer Corp. here, has been doing appraisals for the past 10 years. Because of the volatility of computer technology, no standard publication exists that lists prices of used computer equipment.

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Mormon College Given 370 to Aid Translation Work

PROVO, Utah — Former Brigham Young University President Ernest L. Wilkinson and his family have donated an IBM computer to the university for use in language translation and research.

The IBM 370/138 will be used for computer-assisted translation work on the *Book of Mormon* and other projects.

In the past, the institute has shared computer facilities with numerous other departments on campus, according to Dr. Eldon G. Lytle, director of the university's Translation Sciences Institute, but now translation and research activities can be conducted without the usual interruptions and delays associated with a time-sharing operation.

The institute has developed a text processing system that enables the staff to produce computer-assisted translations in nearly half the time of manual translations and at about one-third the cost, Lytle said.

By mid-1979 Lytle expects to be translating in five different languages, including Spanish, Portugese, German, French and Chinese.

Bankers Meeting Slated for June

ZURICH, Switzerland — An international symposium on computers in banking will be held here June 13-15 to exchange ideas on defining and implementing management and automation strategies.

For further details, contact the secretariat of Interconvention, c/o Swissair, P.O. Box CH-8058, Zurich, Switzerland, or the representative of the patronage and program committee, Dr. G.R. Kutter, c/o Winter Partners, Zollikerstrasse 251, P.O. Box CH-8008 Zurich, Switzerland.

IBMer Attributes Success to Leadership Role

By Catherine Arnst
CW Staff

SAN FRANCISCO — Although IBM is just beginning its defense in the U.S. vs. IBM antitrust trial in New York, its strategy is getting a dress rehearsal in the Memorex Corp. vs. IBM case in progress here.

Rather than disputing whether IBM actually took certain alleged anticompetitive actions, the testimony of IBM witnesses here emphasized the opposite (see related story on Page 71). Several of these witnesses are also scheduled to appear in IBM's defense in the government case in New York, and it is unlikely their testimony will differ substantially there.

On the stand here, IBM's senior vice-president and group executive of the General Business Group, George (Spike) Beitzel, expressed the three major themes on which IBM's defense here is built:

- IBM's product and pricing actions in the general-purpose computer systems and peripherals market were taken to remain competitive, not to block competition.
- IBM always regarded the market as a competitive one in which a firm that wanted to stay in the running could not remain static.
- IBM's success resulted from taking a "leadership strategy" rather than being a "follower." While such a strategy involved greater risks, it also afforded greater profitability.

A distinguished looking man who appeared sure of both himself and his company, Beitzel testified IBM's goal was to "push the frontiers of knowledge in every direction." This was particularly true in 1964, when IBM introduced its System 360, he said.

A man who has spent his entire career with IBM, Beitzel said that the motivation for the 360 was to benefit the user, who "for the first time in the computer industry could design his own automobile" in the sense that he could choose from a variety of options to get the performance he wanted.

By 1969, the 360 line was beginning to show its age as a result of competition from plug-compatible peripheral manufacturers, minicomputers, service bureaus and third-party leasing companies, Beitzel said. To remain effective, IBM's executive suite put into action an internal product management system that would allow the firm to "manage the future."

The system looked at three criteria when considering new products: the customer and his needs, the cost of developing the product and the competition.

Competitors were generally either "sprinters or followers," Beitzel said, adding there is nothing wrong with being a follower. "It's a perfectly acceptable business strategy. There is nothing unethical or wrong with it; IBM just doesn't believe in it."

The advantages of taking a leadership strategy is that for one thing, it is "more exciting." Leaders attract a brighter and more daring group of people. But there are also greater risks because one is not necessarily offering a product which the user has come to expect, Beitzel, who worked his way up through the corporate ranks, told the jury.

Monitoring the Competition

Both Memorex and the government have maintained that an important part of IBM's "leadership strategy" was conducting in-depth studies of competitors that highlighted their weaknesses. Products and pricing policies were then introduced which preyed on those weaknesses, IBM's opponents have alleged.

Beitzel agreed that IBM studies its competitors, but only because "our marketplace is tremendously competitive and we had to know what was going on or our business would not be able to grow."

In spite of attempts to monitor the competition as accurately as possible, IBM consistently underestimated the strength of both general systems and peripherals manufacturers, Beitzel said.

In the early 1970s, IBM set up a special task force, headed by Henry Cooley, vice-president of the Systems Development Division, to study peripherals manufacturers. The reports of the Cooley task force are a major issue in the Memorex lawsuit because they are alleged to be anticompetitive studies.

The Cooley task force was actually just one of many such groups IBM set up and from which Beitzel received reports on almost a daily basis, he said. He also noted that, although such reports may contain recommendations which appear anticompetitive, those recommendations were not followed.

Some of the ideas the Cooley task force presented, such as cutting prices or locking in peripherals devices with the system itself through hardware, software or marketing, were unacceptable because they were basically dead-end solutions that didn't move IBM forward at all, Beitzel said.

It was board chairman Thomas J. Watson's view in particular that the long view be taken for corporate strategies, and he wanted the firm to be based on three principles: respect the individual, provide an excellent product and give the best service possible, according to Beitzel.

IBM started its defense here at the beginning of April and expects to complete its presentation the week of May 15 after approximately 14 witnesses have taken the stand.

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Planning Vital: Bowyer

Mismanaged DBMS Can Hurt User

By Don Leavitt
CW Staff

CHICAGO — Data base management systems (DBMS) "obviously provide us with powerful tools to use in enhancing the capabilities offered by computer-based systems," but they also present new risks that can only be met with enlightened management, according to John W. Bowyer.

The director of information systems services for International Harvester told a recent conference here the familiar pitfalls of DP systems are heightened with data base. He then emphasized the point with an analogy.

"Business systems methods prior to computers were analogous to 5,000 laborers moving a hillside with baskets and traditional computer methods have been rather like giving motorized wheelbarrows to the 5,000 laborers. The data base approach . . . does the job with one atomic blast.

"With the laborers (with or without wheelbarrows), things happen in very small bits . . . work can successfully terminate at any point. With the blasting, on the other hand, everything must be done right the first time or, instead of a mountain to move, there may be a Grand Canyon to fill!" he told the meeting sponsored by the American Institute of Industrial Engineers.

If everything goes right, Bowyer continued, a great deal of time and money can be saved. But "managing data base requires vast management and technical skills, better planning and more precise control" than managing conventional DP operations, he said.

"The potential is great, but the price of failure is dramatic," he reiterated.

Plan to Avoid Pitfalls

To minimize the risks and avoid as many of the pitfalls as possible, managers must first plan what they are doing. "We [must] develop strategies and long-range plans to preclude as many of the problems as possible. We [must] make sure our data center plans adequately address the issues of physical security, physical backup and *real* portability of data and applications, through standardization.

"These strategies cost money but not so much, incrementally, as you might think, if they are properly planned in advance," Bowyer noted.

"Next we must establish standards . . . and a central control point for development, administration, interpretation and enhancement of these standards," the International Harvester manager said, adding, "in a corporation as large and as complex as ours, this means a corporate staff function, adequately staffed to provide a leadership role."

The cornerstone of this central group's mission and charter statement is a design review procedure, according to Bowyer, who explained that data base systems are developed by application systems and programming organization. "But at predefined points in the development process, the formal design review must occur and the outcome must be documented. Our particular design review procedure includes four such checkpoints:

"The purpose of Design Review I is to make the corporate data base administration group aware and involved, at a very early stage, of an application development group's plans to implement a data base system" he said, adding that the purpose of Design Review II is to participate and approve the systems design and implementation plan as prepared by the application development group, "This is the phase in which operations management must participate," he warned.

Design Review III is intended to check the detailed design just prior to programming and ensure that it agrees with the recommendations of Design Review II. "At this time, provisions will be made to generate an on-line test system," Bowyer continued.

"The goal of Design Review IV is to verify that all on-line functions are performing within the standards and that all preparations have been made to place the system in the standard production environment," he said, completing the four-step process.

In addition to the design reviews, the corporate staff people also provide consulting services during all phases of development and tuning services after implementation, Bowyer noted.

"Finally," he said, "we as managers must develop the practice of tackling the issues and problems head-on. To avoid problem situations, hoping to 'fall' into a solution, or hoping the problem will go away, only invites the 'snowballing' effect . . . and eventual disaster."

John W. Bowyer

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Attendee's name supplied upon request

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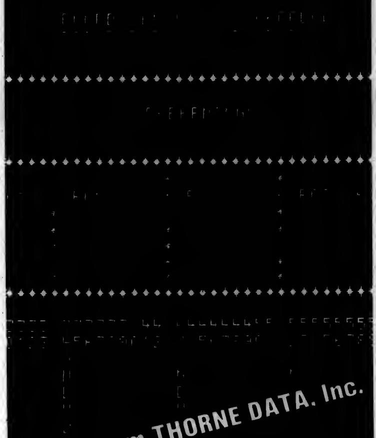

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Service Helps Locate Goods for Handicapped

By Howard A. Karten
CW Staff

BLOOMINGTON, Ill. — A computerized service here is helping handicapped people locate products and information that can make life easier for them.

By searching a data base of products especially designed for handicapped people and tips sent in by others, the system has helped answer such questions as: How can a quadriplegic paint? How can a person with only one arm fish? Where does a handicapped person in a small community buy a battery-powered wheelchair?

The service, called Accent on Information (AOI), is believed by its owner, Raymond C. Cheever, to be the only one of its kind in the country, and he said it handles about 1,000 requests for information per year. Written in PL/I as a joint project between Illinois State University and the Illinois Institute of Technology, the program runs on an IBM 370/145 at Illinois State.

To use the system, a person sends in a letter or uses a special request form from Cheever's magazine, *Accent on Living* (AOL). An information specialist at AOI's office encodes the request and makes out punch cards with the request and the person's address. Requests are then batched, written on tape and run against the 3,500-item data base.

In encoding the request, the information specialist uses a special thesaurus developed for AOI. It contains approximately 5,000 terms that describe subjects of possible interest to handicapped people, including both activities and products. Examples of such terms are *eating, sports, education, mobility aids* and *wheelchairs*.

Thesaurus Essential

The use of the thesaurus is critical to the system, Cheever said, since it allows a product or tip to be categorized in several ways. When AOI receives information on new products, the product is analyzed for any possible descriptors. The name of the product, along with cross-referencing material and the attached descriptors, is entered in the data base.

The descriptors are used to designate the content areas to be searched as well as the method of searching. For example, in looking for information on sports for paraplegics, the information specialist might describe the request like this: (*sports activities* or *recreation*) and (*paraplegics* or *physically handicapped*). The retrieval system will then look for the words "recreation" and "paraplegics" occuring together, "sports activities" and "physically handicapped" together, and so on. This permits flexibility, latitude and thoroughness, Cheever noted.

Since the system became operational in 1976, interest has been much wider than originally anticipated, Cheever said. Public schools, physicians and rehabilitation agencies, among others, have shown an interest.

AOI is an outgrowth of the magazine *Accent on Living*, which Cheever started in 1956, four years after he was stricken with polio.

"There was no central clearinghouse where handicapped persons could get the information they needed about products that could dramatically change their lives," he said, so he decided to start one. Although he charges $6 for the service, the fee is waived if a handicapped person cannot afford to pay.

AOI can be reached through P.O. Box 700, Bloomington, Ill. 61701.

The "spare-hand" fishing belt for the disabled is just one of thousands of hard-to-find devices and services in the data base of Accent on Information.

Non-ACMers: Can You Help?

NEW YORK — The Association for Computing Machinery (ACM) is seeking six nonmember individuals to participate in a workshop on computers and society educational courses and materials scheduled for July 16-18 in Williamsburg, Va.

The participants are being sought to assist in reviewing position statements, materials and recommendations and in evaluating the programs, ACM said.

The individuals will be selected on the basis of a letter of application expressing interest in the subject area. Expenses will be paid.

Application letters with four copies should be sent to Gerald L. Engel, Department of Mathematical and Computing Sciences, Old Dominion University, Norfolk, Va. 23508. They must be received prior to June 1; successful applicants will be notified in mid-June.

Call for Papers

FOURTEENTH MEETING OF THE COMPUTER PERFORMANCE EVALUATION USERS GROUP (CPEUG), Boston, Oct. 24-27, 1978

The theme of the conference will be the role of measurement, evaluation and prediction technology in the major areas of the DP life cycle: planning, acquisition/development and control. Topics include workload modeling, benchmarking terminal systems, installation auditing and performance metrics, standards, prediction and management.

Send two copies of abstracts, summaries of tutorials or summaries of workshops by May 15 to Terry Potter, Program Chairman, Digital Equipment Corp., ML 3-3/E67, 146 Main St., Maynard, Mass. 01754.

COMPCON FALL '78, Washington, D.C., Sept. 6-8, 1978.

The program will focus on communications networks. The Short Notes session will provide an opportunity to present new work or applications; the presentations are restricted to five minutes.

The participate in the Short Notes session, submit a 250-word summary by Aug. 1 to Shirley Ward Watkins, National Bureau of Standards, Technology B212, Washington, D.C. 20234.

Reduces Employee Turnover

Things Go Better With Career Pathing at Coke

By Nancy French
CW Staff

ATLANTA — Career pathing can vary from very formal to very informal, and no single approach is absolutely correct, according to Coca-Cola Corp.'s DP education and standards coordinator. But if your firm's approach is well thought out, the job turnover rate will be low, Mary Chris Williams told a Computer Expo'78 audience here recently.

Coke offers its 173 DP employees a "semiformal" career path that is "planned" and "known informally" to those employees and "relies on its managers" for implementation, Williams said.

People can move upward within a single job category, such as programming or data preparation, for example, whether or not a job slot exists, but a lateral move requires a job opening, Williams said.

CW Photo by T. Scannell

Mary Chris Williams

A great programmer who doesn't want to become a manager to earn a manager's salary can do that, too.

The entire system is based on counseling, training and the use of a data base to maintain a record of employees' training history, experience, nonutilized skills and annual appraisal by management, she said.

But the "heart of the system is training," she said, and that is done primarily on company time.

How It Works

Without revealing exactly what the Coke DP department's employee job categories or salary ranges are, Williams explained how it works.

All programmers and analysts "hired off the street" are expected to have a college degree, she said, but an operator can become a programmer, a programmer can become an analyst and a data preparation clerk can become an operator as long as he has completed the required education modules and the appropriate job slots are open.

As an example, Coke has four levels of data preparation clerks headed by a manager. A third-level data preparation clerk who wants to move into operations can become a second-level computer operator, she explained. A computer operations shift supervisor can become a second-level programmer; seven have opted to make this move since 1976, she said.

Likewise, a data controls specialist whose function is to interface with users in the preparation of data can become a first-level programmer, but would not move into operations, she said, nor would an operations person move into data control.

Third-level programmers can become first-level systems analysts and move up through that career path, she explained.

Salaries overlap in such a way that a person never loses pay, and almost always gains a little, even when moving to a lower level job within a new functional category, she said.

Aspirations Known

Unlike many government agencies and large corporations, Coke tends not to post job openings and relies instead on its manager's knowing what career aspirations employees have, Williams said. This is done through extensive job counseling and a yearly performance review.

This information is sent to the training director, who reviews it and enters the employee's desires, his training history, the manager's appraisal and the employee's perceptions of his abilities and nonutilized skills into a data base that is tapped when jobs open.

Since 1976, and for the next three years, Coke will be using outside audiovisual training packages from Advanced Systems, Inc. Courses are broken into five half-day modules and, with the exception of certain programming courses, they never last longer.

All 173 DP employees are expected to take 80 hours per year of training which, for programmers and analysts, is supplemented by vendor training.

The curriculum is presented to employees in printed form so they know what's expected of them, Williams said. Courses that receive poor employee ratings are modified or replaced, and grades are never reported to management unless the person "fails."

"In such cases," she said, "these failures are reported with the suggestion that the individual be placed in another job."

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Fast Scores Win Fans at Figure Skating Events

Since rink-side terminal operators are more familiar with skating than computing, tutorial interface eases scoring task.

WALTHAM, Mass.— A competitor's split-second timing can make the difference between winning or losing a figure skating event. Similarly, timing in the scoring process can make the difference between winning or losing audience interest in figure skating as a sport.

"Until we computerized the scoring process for the U.S. Figure Skating Association, the 30 minutes to an hour it took to calculate championship standings after each event didn't exactly help generate public enthusiasm for the competitions," according to Honeywell Information Systems, Inc. computer analyst A.L. Beard.

HIS has donated processing time to run the programs since 1972 when the U.S. Figure Skating Association, of which Beard is an executive committee member, began testing the computerized scoring system in parallel with manual methods. The programs have been used to provide official scoring for regional, sectional and U.S. Figure Skating Championships since the 1973-74 season and the world championships during the 1975, 1977 and 1978 events.

"Scoring of figure skating events is considerably more complex than the high/low discard and averaging system of gymnastics and diving. Although this scoring system can handle more disparate marking situations more fairly than the simpler systems, it requires some lengthy calculations," Beard said.

Each event is decided by a panel of judges, typically seven or nine. Each judge evaluates the skater independently and grades the performance on a scale of zero to six in .10 increments.

The judging system is supported by a scoring system carefully designed to find a consensus among the judges and minimize the effects of judges who are inconsistent with the majority.

The computational part of the scoring process is handled by a group of skating association volunteers who are designated accountants. Two of them operate two rink-side terminals connected by a telephone line to two HIS CPUs on a time-sharing basis.

Results are printed on the terminals about 30 seconds after all the data is entered. They must then be certified by the chief accountant and the referee, signed, photocopied and distributed. The entire process takes five to 10 minutes.

Final results, of course, are most important. But the value of a computerized scoring system is most apparent in the posting of intermediate standings, something which was not possible before automation.

In addition to generating greater audience interest, the availability of intermediate standings increases the spirit of competition among the skaters, Beard said.

"A figure round takes up to 3-1/2 hours to complete," he said. "Before we computerized, no official standings were available throughout this long period. The judges' marks were available for each figure, but marks are not standings. The skaters and the public wanted standings.

"With these results available, the skaters knew almost immediately who had moved up and who had done a figure badly and dropped back," he noted.

Programmed for Novice

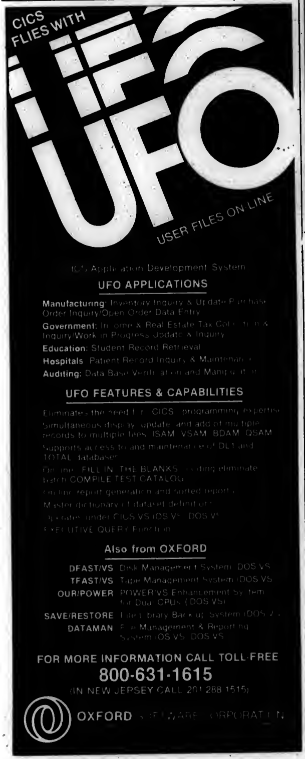
The rink-side terminal operators are intimately familiar with skating, but not with computers. The programs were designed to present the novice operator with a tutorial interface in skating terminology and to make all input and output parallel the previous manual formats as much as possible.

The programs are written in Fortran. The operator directs the program by entering an event code — or file name — followed by a command to the program. File names were called event codes to make the terminology easier for the operators. Event codes are two-character abbreviations of the event name, such as JL for Junior Ladies.

"The command language is a decided departure from normal time-sharing procedures," Beard said. Rather than using alphabetic verbs or abbreviations, the commands to the program are numeric. This simplifies the programs and, more importantly, makes it easier for the operator.

During the U.S. championships in Portland, Ore., in February, processing was done by two HIS 60/66s at HIS' Phoenix facilities.

A HIS 6040 at the National Capital Commission in Ottawa and a 66/40 at Scarborough, Ont., provided continuously updated standings throughout the five days of world championship competitions in March. Beard served as the accountant responsible for computer operators under the Canadian chief accountant during these events.



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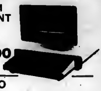

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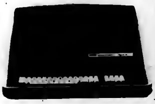

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Idle OCR Costs Idaho $4,000/Mo

By Howard A. Karten
CW Staff

BOISE, Idaho — The state of Idaho has been paying $4,000 in monthly rental fees for nearly five months for an optical character recognition (OCR) scanner it is not using. And that situation is likely to continue until July, according to Laird Justin. director of DP for the state auditor's office here.

The device, an IBM 3886 OCR reader, was delivered in December to scan time sheets for a payroll system now being developed. At the time of delivery, Justin said, he was uncertain when the system would be installed.

Rather than cancel the order for the scanner, he accepted it, knowing that testing the scanner could be done concurrently with other development work.

A significant factor in accepting the scanner was the knowledge that a lead time of nine to 10 months is necessary when ordering this type of equipment, according to Justin.

Personnel Turnover

Personnel turnover has been a significant factor in the delay of the project. In the past year, 11 programmers and analysts have left Justin's staff, and five such positions are presently open.

Salary scales are a significant factor in this turnover, Justin feels. The city of Boise has several other large DP shops competing with the state for personnel, including Boise Cascade Corp., Morrison-Knudson Co., Inc. and several large banks.

"There's a significant demand for programmers and analysts and a very small supply here . . . state installations have a big problem keeping good people, and the salary structure is a big reason," Justin said.

The rental of the scanner has not been a total waste, however, according to Justin, since other Idaho governmental agencies, such as the Department of Health and Welfare, have also been testing the scanner for use in developing systems.

The state auditor's office presently runs an IBM 370/158, operating in part as a service bureau for other state departments and agencies.

Pay-by-Phone Bill Service To Cover Two-State Area

By Marguerite Zientara
CW Staff

CINCINNATI — A telephone bill-paying service will be offered beginning July 17 in southern Ohio and northern Kentucky by 13 savings and loan (S&L) associations.

The joint effort, called Pay-by-Phone, is being made through Automatic Data Processing, Inc. (ADP) here and will be the first multiple S&L system in the country and the first to cover a two-state area, Janet McInerney, Pay-by-Phone manager said.

ADP provides on-line DP services to S&Ls in a six-state area, including Kentucky, Ohio, Indiana, Tennessee, West Virginia and Illinois, and the firm has contracts in Pennsylvania and Michigan.

The system differs from other telephone banking services in that a Pay-by-Phone customer is not restricted to using a Touch-Tone phone. The customer will talk to a human teller who will handle all transactions, answer questions and read back the customer's payment requests, McInerney noted.

Initially there will be four human tellers, based here at ADP, who will work with a Digital Equipment Corp. VT52 CRT. The system runs on a DEC 1134 CPU, with a LP11 300 line/min printer and an LA180 180 char./sec printer, McInerney said.

System Description

To join the system, a customer opens a 5.25% interest-bearing Pay-by-Phone account. Dollars deposited earn interest until the day they are needed to pay bills, and the account may be treated as a savings account, allowing deposits and withdrawals.

The customer lists recurring fixed bills, such as mortgage and car payments, and recurring variable bills, such as utility bills and credit card payments. The merchant's name, mailing address and the customer's account number are also listed. The fixed amount bills may be paid automatically each month on a date designated by the customer, McInerney said.

To pay recurring variable bills, the customer calls the Pay-by-Phone number and states his Pay-by-Phone account number and secret code. Then the customer identifies the merchants to be paid, the amount and the date of payment, she explained.

Daily Checks

Each day the Pay-by-Phone system writes one check for each merchant and provides a listing of the customer's names, account numbers and amounts paid.

Once a month, the customer receives a descriptive statement showing to whom the bill was paid, the amount and the date of payment.

The ADP project uses a system developed by Telephone Computing Service Inc. (TCS) in Seattle. TCS is the originator of telephone bill-paying, McInerney said, and a vendor of telephone bill-paying services. With the addition of the 13 S&L associations, TCS will have 67 financial institutions nationwide offering the service.

Cost: 10 Cents

In the U.S, about 125 financial institutions have 285,000 telephone bill-paying accounts with approximately 565,000 transactions per month. Currently 90,000 merchants around the country are being paid through a telephone bill-paying system.

Pay-by-Phone reduces the amount of check writing and eliminates postage and envelope costs. McInerney estimated that each bank will charge "probably 10 cents per transaction."

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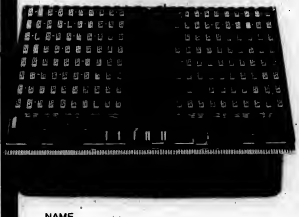

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In New York in November

Meeting Set on Transborder Flows

NEW YORK — Transborder data regulation and the world information economy will be the focus of attention at a Nov. 28-30 conference here sponsored by Online Conference Ltd., a London-based firm.

The conference — a follow-up of one held in Brussels last February — is designed to bring American DP manufacturers, service companies and communications suppliers up-to-date on recent developments in Europe and the developing countries where governments want to share or control the information economy within their borders.

The conference will draw together decision makers from both government and commerce from many nations, according to the meeting's organizers.

Jan Freese of Sweden, Louis Joinet of France, Rudolph Schomerus of Germany and Gerhard Stadler of Austria will discuss national laws and their transborder implications.

Frits Hondius will report on the status of the Council of Europe's draft treaty and an European Economic Community spokesman has been invited.

Data communications issues will be reported on by Torsten Larsson of Sweden, who has been asked to speak on European postal, telephone and telegraph (PTT) developments.

Final site arrangements have not yet been made, but sponsors expect conference expenses to be about $750- to $800 per attendee.

Further information is available from Carl Fielstra, at the law offices of John Eger, 1742 N Street N.W., Washington, D.C. or from Richard Elliot-Green, Online Conference Ltd., Cleveland Road, Uxbridge, England UB8 2DD.

Data War Smoldering

WASHINGTON, D.C. — An information war is smoldering on two fronts, according to the American edition of *European Community* magazine. Danger signs are up because Europeans fear a situation like the one that exists between the U.S. and Canada, in which data increasingly winds up in American computers, beyond Canadian control.

"So far no major international dispute has developed, but the Europeans who deal extensively with multinational corporations see themselves in a position comparable to the Canadians'," the magazine said.

Technology has offered a second front, according to author Jonathan B. Tourtellot, "in the form of satellites able to outperform anything previously set aloft. This battle has been quietly brewing through the United Nations Committee on the Peaceful Uses of Outer Space and involves direct broadcast satellites, which can push unwanted information into a country, and Landsat, which can take unfavorable information out.

Calendar

June 21-23, Toronto — **Data Processing Operations Management**, sponsored by the University of Chicago Center for Continuing Education. Contact: The University of Chicago Center for Continuing Education, 1307 E. 60th St., Chicago, Ill. 60637.

June 21-23, Washington, D.C. — **Distributed Minicomputer Networks**, sponsored by the Institute for Professional Education (IPE). Contact: IPE, Suite 601, 1901 N. Fort Myer Drive, Arlington, Va. 22209. Also being held July 26-28 in San Francisco, Aug 23-25 in Boston and Sept. 27-29 in Washington, D.C.

June 21-23, Washington, D.C — **On-Line Systems Audit Controls**, sponsored by the Institute for Professional Education (IPE). Contact IPE, Suite 601, 1901 N. Fort Myer Drive Arlington, Va. 22209. Also being held July 19-21 in San Francisco, Aug 28-30 in Washington, D C. and Sept 20-22 in Denver.

June 25-28, Lancaster, Pa. — **Association of Data Communications Users, Inc. Annual Seminar and Business Meeting**. Contact: H. Hershkowitz The Chase Manhattan Bank, 17th Floor, 1 New York Plaza, New York, N.Y. 10004.

June 26-28, Santa Barbara, Calif. — **36th Annual Device Research Conference (DRC)**, sponsored by the Institute of Electrical and Electronics Engineers Electron Devices Society. Contact: Dr. James C. McGroddy, 1978 DRC Chairman, IBM, T.J. Watson Research Center, Yorktown Heights, N.Y. 10598.

June 27-29, Helsinki Finland — **Third International Conference, Software Engineering for Telecommunication Switching Systems**, sponsored by the Institute of Electrical Engineering (IEEE). Contact: Manager, Conference Department, IEEE, Savoy Place, London WC2R OBL, England.

June 27-29, Atlanta — **Electronic Computing in Civil Engineering**. Contact: Civil Engineering Program Applications, P.O. Box 1532, Rockville, Md. 20850.

June 28-30, Washington, D.C. — **Configuration Management of Software Programs**, sponsored by George Washington University. Contact: Continuing Engineering Education, George Washington University, Washington, D.C. 20052.

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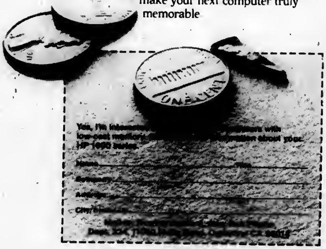

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System Lets Firefighters Know What to Expect

By Marguerite Zientara
CW Staff

KANSAS CITY, Mo. — When a fire alarm rings in Kansas City, firemen know just about what to expect at the scene of the incident, thanks to the fire department's sophisticated computer system.

By the time an engine company is racing to a fire, dispatchers at the Fire Alarm Exchange are radioing to them informetion gleened from terminals and printouts that details the location, condition and occupants of the affected building.

The fire department uses five software programs to aid in its No. 1 priority — lifesaving — and its No. 2 priority; property conservation, according to Doneld B. Stein, the department's administrative assistant for computer services.

The Invalid end Bedfast Persons List and the Guard Dog Information programs are two that were developed "from scratch" within the department, Stein said. If there is en invalid in the building where firemen are going and that person has been registered with the department, the firemen will be told the invalid's name, his ailment, whether he can walk and in which room he should be found.

Since people reporting a fire often call in an imprecise address, Stein explained, that program was changed to indicate any invalid in a certain block of a street, rather than just a building.

The Guard Dog Informetion will indicate guard dogs and occassioinally other potentially dangerous animals in a building. Also indicated are their handlers' names and telephone numbers so someone can immedietely be called to help the firemen get inside a building.

Informational Accesses

Since the system runs on Kansas City's all-purpose IBM 370/158, it can access the city's real estate records to determine exactly what kind of building is at a reported address. "If an address check indicated there was no building at a reported address, we would send one vehicle just to check it out, but not a full response of five vehicles," Stein explained.

The system can also ecess the water depertment's file, which shows whether a building is occupied, and whether there is e sprinkler system in the building. The Depertment of Motor Vehicles file would identify the owner of a burning cer so he could be notified.

In addition, if a fireman were to be injured or become ill at the scene of an incident, Stein said, the system would indicate his blood type, any ellergies he suffers, whom to notify, what hospitel he prefers end the name of his personel physician.

Main Program

The main program in the system is the Uniform Fire Incident Reporting System (Ufirs), which was purchesed from the Netional Fire Protection Association (NFPA) es a management tool. The data input to this system, such as how many men were on a particuler truck, what kind of truck it wes and what equipment was used for en incident, is used for compiling monthly statistics for the department.

Used in conjunction with Ufirs is the Statisticel Package for the Social Sciences (SPSS), developed et the University of Chicago. SPSS is a programming aid consisting of 16 subprograms which permit e program to be written using only seven or eight punch cards, Stein seid.

"For exemple, Ufirs hes a monthly printout that shows how many calls came in by hour of day and day of week for that month. If you want to learn about Jan. 1 to March 31, you would have to run the January, February and March reports and add them all together.

"With SPSS, we can get all of it together," he explained. "Under Ufirs we get a record of ell the calls. Under SPSS, we can say what hour of the day most of the fires occurred or what hour of the day most of the first aid calls occurred."

There is quite a variance in the number of first aid calls to which each fire truck responds, Stein pointed out. SPSS can indicate which truck should be the next one to get a new resuscitator or which company should get the next new truck which is determined by usage.

While many other cities are meking use of one or more of the computer tools that Kansas City has adopted, "it is unusuel for all of these to be juxtaposed," eccording to Philip S. Schaenman, associate administrator in charge of the National Fire Data Center of the National Fire Prevention and Control Administration (NFPCA) in Washington, D.C.

"I don't know thet it is the leeder, but it is far up on the list, one of the more edvanced cities," he added.

Four Terminals

The system, which is about three years old, mekes use of two IBM 3275 remote entry terminels located at the Fire Alarm Exchenge building and two IBM 3277 direct-access terminels in the mein office at City Hall.

The department is now studying the feesibility of a computer-aided dispetch system which would keep track of eech truck's status, Stein said. That type of system would indicate the trucks closest to e fire geographically or time-wise, based on the street network, he expleined.

Stein hopes in the future to have "reasoneble numbers of fire trucks where the fires are likely to be. It doesn't make sense to have, for example, 80 men downtown during the day when we have 10,000 office workers there and heve 90 men at night when there's no one there."

Ribicoff to Talk To DP Auditors At June Meet

DEARBORN, Mich. — Sen. Abraham Ribicoff (D-Conn.) will speak on computer crime legislation at the sixth international conference of the EDP Auditor's Association here June 19-21.

Ribicoff will eppear at the general session Tuesday morning June 20.

The conference, which will emphasize "advanced concepts and practical applications," will also feature a keynote address by Alan Taylor, a consultant and columnist for *Computerworld*.

Additional information on the conference slated for the Hyatt-Regency Hotel here, is available from Seymour S. Ribiat at Blue Cross-Blue Shield of Michigan, 600 E. Lafayete, No. 1012, Detroit, Mich. 48226.

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System Due Up in '81

CRTs to Replace Radios in L.A. Police Cars

By Marguerite Zientara
CW Staff

LOS ANGELES — By 1981, computer terminals will have replaced patrol car radios for the Los Angeles Police Department (LAPD), allowing police officers to check and obtain information up to 80 times faster than through normal voice communications.

Under a $27,347,500 contract with System Development Corp. of Santa Monica, Calif., 850 E-Systems, Inc. MDT 800 CRT terminals will be installed in the entire marked fleet of the LAPD, according to Sgt. David Wiltrout, police liaison for the Emergency Command Control Communications System (ECCCS).

The system will reduce delays in information transmission from the present rate of up to 20 minutes to 5-15 seconds, Wiltrout said.

Under the present radio-based system, an officer in the field must request a radio frequency, for which he may have to wait a few minutes. When he gets a clear frequency, he reads the CRT operator at the station the information needed to determine whether a suspect is wanted. That information includes all that is furnished on a driver's license — name, address, height, weight, sex, hair color, eye color and the license number, Wiltrout said.

As the operator receives the information, it is input to a CRT. Once he gets a response, there may be a considerable delay before the operator can relay the information to the field officer, since he must share the frequencies with three other operators and acknowledge any transmissions received while waiting for the frequency to clear.

Transmission System

The ECCCS system will allow an officer to type in the information at his own speed. Since the department is in the process of converting to an all-portable radio system, the existing mounted radio apparatus in each patrol car will be used to transmit the data digitally to a series of receiving radio towers, Wiltrout explained.

The information will then be transmitted via land lines or microwave to a cental downtown location. There, five E-Systems, Inc. RDC 90 Radio Data Link Converters, one for each channel, will receive and convert the information for input to four Digital Equipment Corp. PDP-11/70s.

Those computers will then reformat the information into several messages for input into files of local wants and warrants maintained by the City of Los Angeles, Wiltrout explained. Almost simultaneously, messages will also be sent to the state information system to check on wants and warrants at the state level and to the National Crime Information Center (NCIC) to check on national wants and warrants.

A second benefit of the system is in the area of security, Wiltrout noted. "We know for a fact that criminals frequently use scanners and other radio devices to listen to our calls and avoid arrests," he said. "With this system they won't be able to, since you can't eavesdrop on digital transmissions."

The MDT 800 utilizes a small reflective screen with a mirror arrangement at its base, which enlarges the CRT display and minimizes the danger of its implosion in the vehicle, Wiltrout said.

Clearly Not A DP Error

DALLAS — Computers are getting more and more human these days. In fact, a so-called "computer" in the Urban Planning Department here goes by the name of Jo Anne Yadack, and while she may sometimes wish she were a computer, Yadack is actually very human.

The identification error arose when a city official attempted to explain how street names in a recently incorporated community were going to be renamed to eliminate duplication as well as make the names more interesting and romantic.

Unfortunately, the official wasn't sure how the task was to be accomplished and, when asked by reporters, answered that a computer was going to do it, hoping that would satisfy everyone. The information was widely reported by several newspapers and at least one wire service.

But in the meantime, Jo Anne ("The Computer") Yadack is working out all the details of the street name changes in a very uncomputerlike way — by hand.

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P39334

Editorial

Sound Development Approach

The Automatic Transmission of Mail (Atom) system by Combustion Engineering, Inc. (CE) [CW. May 1] is interesting not only in itself, but also in the way it was developed.

Instead of performing a massive study of the needs for an electronic mail system and the possible ways of meeting those needs, the firm plunged right ahead and developed one — for the cost of such a study.

When it is modified and the final version settled on, the resulting system will be based on actual user experience with the pilot system and not just speculation as to what users want and will use.

Obviously such an approach will not work for all applications, but the technique could be applied in many other areas. Too often, both DPers and end users spend as much time planning systems as they do implementing them, and while this can be justified in many cases, it can also lead to wasted time and money.

Even after many of these elaborate plans, the developers sometimes find systems do not work as well as in actual practice as they did on paper. Then, it's back to the drawing boards for the development of a second system — this time based on real experience with the first design.

CE cut through that process by designing and implementing what it called a throwaway system. It works and is giving users hands-on experience. Since it cost about the same as a plan might have, the firm is now way ahead because it will have user experience in addition to planners' ideas when it implements the final version.

'Just You Let Us Pros Handle It, Uncle . . .'

And Just Before NCC . . .

With all the buildup under way for what promises to be the largest computer conference ever — the National Computer Conference in Anaheim, Calif., June 5-8 — hopefully the smaller but at least as interesting History of Programming Languages Conference (June 1-3 in Los Angeles) will not be overlooked.

Sponsored by the Association for Computing Machinery (ACM) Special Interest Group on Programming Languages (SigPlan), the conference was designed to preserve the historical record of the development of several of the major languages in current use.

The speakers include the developers of some of the major languages: Alan Perlis and Peter Naur on Algol; Ken Iverson on APL, Douglas Ross on APT, Tom Kurtz on Basic, Jean Sammet on Cobol, John Backus on Fortran, Geoffrey Gordon on GPSS, Charles Baker on Joss, Jules Schwartz on Jovial, John McCarthy on Lisp, George Radin on PL/I, Kristen Nygaard on Simula and Ralph Griswold on Snobol. The conference will be keynoted by Grace Hopper.

In all, the three-day affair promises to offer some interesting insights into how languages are developed, all straight from the horses' mouths, so to speak.

So in addition to the big show in Anaheim, users and computer buffs — particularly DP history buffs — would be well advised to spend a few days up the coast in Los Angeles. Registration fees range from $65 for SigPlan members to $80 for non-ACM members. Information is available from Rorrie Ratkevich, Ground Systems Group, Hughes Aircraft Corp., 1901 W. Malvern, Mail Drop 606-K126, Fullerton, Calif. 92634.

Data Past

Eight Years Ago
May 13, 1970

ATLANTIC CITY, N.J. — A committee sponsored by the American Federation of Information Processing Societies last week called for the development of a code of professional conduct for the computer and information processing field.

— — —

ATLANTIC CITY, N.J. — Viatron announced at the Spring Joint Computer Conference that it was leaving the leasing business and that it was breaking its bargain price structure.

The price of the 2101 microprocessor was raised 70% to $1,640, while the price of the Viatape recorder was boosted from $196 to $384. Also gone was one "free" black-and-white video display for those who ordered multidisplay systems.

Five Years Ago
May 9, 1973

TULSA, Okla. — Hints about IBM's future product line were revealed in documents introduced in the IBM/Telex Corp. antitrust trial here.

Under the code name "Midas," the 3330 disk drive, introduced three years earlier, was being modified to create a new style drive with half the capacity and fewer disks per pack for small, medium and intermediate installations. The other major developments described in the court documents were the "Iceberg," a double-density 3330 drive and the "Apollo" drive for the future generation 375 family of computers. IBM documents also indicated that the "Winchester"-type technology, also under development, might delay introduction of the Midas disk product.

Letters to the Editor

Jumping the Gun?

There is no such thing as an ANS Fortran 77 language yet, contrary to your story "ANS Fortran 77 Introduced for Mini-, Microcomputers" [CW. April 10].

Douglas M. Grant
Stamford, Conn.

Reader Grant is logically correct but common usage doesn't always follow logic. Now that the American National Standards Institute has approved the new Fortran (see Page 29), it has also sanctioned the continued use of the informal name Fortran 77 to distinguish the now-current standard from other proposals. Ed.

Tips on Evaluating DBMS

I found the recent article on the misuse of the label "data base management system (DBMS)" [CW, April 17] most interesting and relevant to the current DP environment.

We have done some soul-searching on this and have developed a set of criteria that a package labeled "DBMS" should satisfy. These were developed from the viewpoint of large mainframe users and do not attempt to address the Codasyl versus non-Codasyl distinction. DBMS should offer:

- Data compression (automatic is preferable to user exit type).
- Data independence.
- Interfacing from high-level host languages such as Cobol, PL/I, Fortran and BAL (although BAL is not considered high level).
- Built-in safeguards for data integrity.
- Security down to field level.
- Support of multiple keys with nonunique values.
- Logical view of required data.
- Logically relating different files.
- Integrated data edit features.
- Interactive query facilities.
- Interfacing with major teleprocessing monitors and systems.
- Provision of centralized control and monitoring of data base through relatively simple utilities.
- A good report writer facility.

A particular installation may wish to alter the terminology or even compromise on some of these criteria, but any such compromise is most likely to result in the degeneracy of DBMS into file management systems (FMS). Indeed, FMS may be what many installations really need.

V. Venkatakrishnan
Aetna Insurance Co.
Hartford, Conn.

Pascal Attractive Anyway

In "Growth of Pascal Called Revolutionary" [CW, April 24], Richard Cichelli stated that "The Pascal 6000 compiler outperforms Control Data Corp.'s Fortran, Cobol and Algol compilers."

The Pascal 6000 compiler does outperform the Fortran compiler in that it compiles Pascal programs and the Fortran compiler doesn't! I don't think there is any other sense in which it can reasonably be stated that the Pascal 6000 compiler outperforms CDC's Fortran.

Pascal is a very attractive language. Here and at many other colleges and universities, it is used extensively in computer science and computer engineering courses.

Pascal's advantages have been enough to attract many users. There may eventually be Pascal compilers on the CDC systems that compile as fast as the Fortran compilers do and that produce the kind of optimized code Fortran compilers produce, but such compilers do not yet exist.

Saul Rosen
Director, Computing Center

Purdue University
Lafayette, Ind.

Above Technical Know-How

Operations Supervisor Puts Leadership First

By Jack Stone
Special to CW

"Raise your hands if you feel your operators and control personnel are hardworking, competent, motivated employees."

I asked this of a group of operations managers and supervisors attending a recent operations management seminar I presented. I was surprised to see the hands of about a quarter of the people present, the most I've seen from any group.

During coffee break, I chatted with one of the attendees who responded quite positively to the question. She was so enthusiastic about her operations team that I asked for the opportunity to tell her story.

Here is my interview with Wanda Anderson, data center operations supervisor for the Ray-O-Vac Division of ESB Ray-O-Vac, Inc. of Madison, Wis.

Q. Wanda, would you begin by relating your DP background?

A. I started as a data entry operator and after several years, I was promoted to data entry supervisor. Four years later, in 1976, I was given the opportunty to become data center operations supervisor.

Q. And the hardware you now have installed includes . . . ?

A. We have a medium-scale mainframe installation, with 512K of main storage, eight disks and six tapes. We also support low- and high-speed terminal applications during prime shift.

Q. What experience did you have in the machine operations department that qualified you for the supervisory job?

A. I was acquainted with the organization, procedures and personnel, but I really didn't have any direct experience in the machine room as an operator.

Q. That's quite a step, isn't it, moving from keypunch supervisor directly to an operations supervisor position with substantial responsibility for a complex production facility? Did you have a lot of technical training that prepared you for the task?

A. Not really, no. Oh, I knew the basics of business DP and we had enriched the data entry jobs with off-line communications work, but that was about it.

Q. On what basis, then, do you feel you were selected for the job?

A. I believe I was offered the job because I demonstrated success in bringing primary supervisory skills to the keypunch area. We had a great team of people in that department and worked well together to get the job done. Apparently, my management felt these same skills were required in the computer room, and I was given the promotional opportunity.

Q. Would you identify these skills?

A. Basically, they are those relative to leadership and employee relations. Of course, technical skills are desirable, but were considered secondary in importance to the real job to be done — by both my manager and myself. Besides, we both felt I could attend technical classes along the way.

The Human Connection

Q. Have you been able to pick up the technical training or experience you feel you need?

A. I feel I have made a great deal of progress. However, I realize, because the environment changes so fast, I have to keep growing.

Q. But how are you able to make intelligent decisions if you are light in the technical skills area?

A. Oh, you don't understand! Although there's much more to learn, I feel I have enough of an understanding to handle the decision-making aspects of my job. Besides, we have, in other sections of our data center, people with good skills and experience who are willing to provide assistance in the technical area. We all work together as a team to get the job done.

The problem is that I feel somewhat short of the technical background needed to train the operations staff. I strongly believe a major responsibility of the supervisor is to personally conduct the technical training. In addition to the quality of training it can provide, it helps build strong relationships between management and employees.

Q. How successful are you in your current job?

A. I believe my management is satisfied with my performance, and, except for my concern in handling the technical training, I feel comfortable in handling all the functional areas, particularly the operations and personal aspects of the job.

One reason for my progress has been the excellent company-sponsored training programs in supervisory skills and communications. I have taken courses in interviewing, performance appraisal and transactional analysis, to name a few.

Q. Would you share some of the guidelines you have found useful in building your capabilities as a supervisor?

A. Surely. The first is to address and resolve personnel performance problems as they occur. You shouldn't wait until performance appraisal time.

A second is to listen to the staff express their likes and dislikes about their jobs. Then, add them all up and see if you can find alternate ways of organizing or operating that can better meet what the staff prefers, without having a negative impact on production.

In addition, the supervisor should deal with employees in a candid, straightforward way. He should also be able to build the same attitude in the staff.

Business Offerings Growing

Software Can Make TRS-80 More Than Toy

The Taylor Report
By Alan Taylor CDP

The development of computers is more a matter of software than of hardware. So last August, when the Radio Shack Division of Tandy Corp. promised payroll systems for less than $20 as well as delivery of more complex business systems later, the matter was of more than minor interest.

It's now been six months since the first release of the Tandy/Radio Shack TRS-80, and software development, as with any new system, is experiencing some delays. The disk operating system has not yet been released, although Tandy's John Roach tells me it won't be long.

The documentation is also running somewhat behind schedule. The Level Two manual is not yet available although Level Two systems are in the field for evaluation purposes. However, the manual has been written and is in galley form.

There is actually a series of manuals available for Tandy's software package. Of these, perhaps the best developed are the checkbook balancing and budgeting system of the personal finance package and the payroll package for up to 12 employees.

The software documentation isn't particularly uniform from one manual to another. The personal finance package manual, for instance, gives flowcharts of each of the four programs (initialization, checkbook balancing, monthly budget and final budget summary.) However, the payroll package, with its two complicated programs (the update and summary and the payroll program), does not have such charts.

All of this raises the fundamental question as to whether the Tandy computer is little more than a toy or something computer people have to take seriously.

Easy to Criticize

The facilities of the present Tandy system are easy to criticize. The $600 Level One, which is the only one available at this time, does not produce hard copy and has only a restricted 4K user memory. The programming results are correspondingly modest.

Moreover, even when the Level Two system arrives, with its increased speed, more peripherals and better Basic, users are going to have to face the problems of serviceability and reliability.

Yet when all is said and done, a fabulous amount of work can be done on the current Tandy system. And, any computer-wise group can use it — a family or an organization with a couple of amateur programmers.

The fact is, in the past 25 years, understanding of DP has risen to the point where there is now hardly an area in the country that doesn't have some DP-wise residents. Indeed, I suspect at the moment there are at least as many of these people as there are individuals familiar with car mechanics.

I think it's in this "computer-literate" environment that we have to look at both the software and hardware of the Tandy computer event. For, make no mistake about it, the TRS-80 is an event, and by the time one adds in the other home computers, "home-computing" adds up to a very significant resource from the point of view of professional DPers and the "traditional" DP establishment.

Understandable System

If carefully broken down, the particulars of the system's payroll package, for example, are not too hard to understand and the type of business for which it is designed won't, I think, have too much difficulty using it.

About a year ago, while talking of some Digital Equipment Corp. systems, I commented that their introduction could change the computer markup situation and bring things down to a more reasonable level. And I think last year did see some reduced hardware markups. This situation is equally true of the Radio Shack systems. Already sales have surpassed the 10,000 mark and the demand is from people who want to take control of their own work, not from "computer-niks."

There are going to be quite a number of failures with the TRS-80s, but there are also going to be many successes. As more types of software become available from sources and as more connections can be made to the system, the importance of these units will increase. As for reliability problems, at these prices (the maximum business system costs about $3,000) the systems form a DP capability that many can afford to duplicate.

The system, however, still depends on that all-important software base to make it more than a toy, so I'll keep you posted as its software (and that of its competitors) is introduced.

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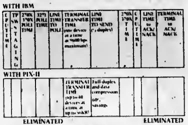
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Detach here, fold, and place in post-paid envelope attached through binding.

Reader Commentary

Stretching Back to IAS

Smithsonian Sparks Memories of DP Roots

By Anthony C. Constable
Special to CW

Except for a two-year spell in California, I have lived in and around Washington, D.C., for the past 10 years. Like many residents, I have not spent as much time as I should have at the truly great local museums that comprise the Smithsonian Institution.

A short time ago, I was asked if I would like to attend a private showing of the Smithsonian's collection of computing devices. The viewing had been arranged under the aegis of the local chapter of the Data Processing Management Association. Intrigued, I agreed at once.

It was a Tuesday evening early last March. We arrived at the "Associates" entrance of the Smithsonian's Museum of History and Technology shortly before 7:30 p.m. The guard directed us to the building's main foyer, where all such tours assemble.

The guide for our party was Dr. Uta Merzbach, curator of the institute's Mathematics Department. Merzbach explained that because of the security precautions surrounding a nearby "loaner" exhibit, we would have to see the exhibits backward, that is, the most recent one first. This accident of scheduling resulted in a unique and excellent viewing of the Smithsonian's collection of computing devices.

The main hall that houses the institute's computer collection is shared with the petroleum, nuclear energy and physical science exhibits. Computing, I am pleased to report, is very well represented; the area devoted to its exhibits is larger than each of its neighbors.

All of the true computers currently on display were built during the 1946-1956 time period. More modern equipment will follow as its time-from-obsolescence increases and more room is found.

IAS and Univac I

At our first stop we were shown portions of the IAS machine. This machine, Merzhach explained, represented the practical realization of the von Neumann concept of internal storage (electrostatic in this case) in a computing device. I asked if IAS was an acronym for "immediate access storage," but was told this particular IAS stood for the Institute of Advanced Studies at Princeton.

The IAS machine was limited since it was programmable only through firm wiring. It did, however, have random-access storage and performed binary arithmetic in parallel. As the prototype for several later machines, the IAS machine deserves its place in this the computing Hall of Fame.

We then inspected some pieces of the first Univac I machine which were acquired from the Bureau of Census. The Univac I actually aced the then-current IBM offerings and should have given IBM a real run for its money. That was not to be.

However, the Univac I did have many interesting technical aspects. We saw its Unityper, a typewriter-like peripheral device that handled both the input and output of paper tape. Great Grandmother complete with knitting needles in her chignon would have looked good behind this one.

Next to the Unityper was one of the first magnetic tape drives, the Uniservo I. This device passed reels of magnetized metal tape at read/write speeds of 100 in./sec and recorded its data at a very low density.

The tape reels were, of course, extremely heavy. A full-sized reel weighs about 20 pounds and holds only 200 feet of tape.

Alongside of this was the Univac I console. Merzbach told us the machine had been built around the principle of "acoustic mercury delay lines," but was unable to answer why the console contained switches labelled "Heater I" and "Heater 2." She did, however, strongly dispute my suggestion that these had been provided to keep the operator's feet warm.

Creature Comforts

My postulation began to sound more promising as we were shown the next machine. This beauty's console had come complete with an ashtray and cigarette lighter as well as a built-in telephone. The ashtray proved conclusively this was not an IBM machine; the elder Watson would never have gone for that.

It turned out to be a Burroughs machine, the J1. This machine had seen service guiding the early rockets and satellites at the then-named Cape Canaveral in Florida.

The J1 is believed to have the first fully transistorized computing machine ever delivered. It is enthroned upon what is probably an early example of a raised floor and, consequently, the exhibit looks real.

We were allowed to pull out and examine one of its 20 or so program panels, each of which is about half of the size of a regular doorway. It is incredible to think that these removable panels, when wired and used in conjunction with console switches, could act as the guidance mechanism for a huge rocket.

Since the J1 appeared to be a relatively complete machine, we wondered if it was still operational. We were told the machine could be put back into running order, but that it would be difficult to find an application that would come close to justifying such an undertaking.

I agreed it would be hard to imagine the old work horse churning out Snoopy calendars for the tourists on its double pizza-oven-sized drum plotter. Even the Smithsonian itself, I was disappointed to learn, relies exclusively on more modern equipment to handle its internal computational needs.

Behind the J1's raised floor we discovered a device reminiscent of an old public weighing machine. It was one of the tape transports from the National Bureau of Standards' Seac machine.

SEAC stands for "Standards Eastern Automatic Computer" and should not be confused with Swac, Seac's faster little brother which was domiciled in Los Angeles.

The Seac tape drive is interesting because it employed the notion of keeping all of the read or written tape from a reel heaped up within its vacuum chamber instead of winding it onto a take-up reel, as do most modern tape drives. The pur-

(Continued on Page 26)

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Capitol Museum Sparks Memories of Past

(Continued from Page 25)

pose, Merzbach stated, was to maximize the rewind speed.

If this methodology strikes you as archaic, it is worth remembering the popular 8-track cartridge works on a very similar principle.

Our next stop was at the Whirlwind I, built at MIT between 1948 and 1952. The development project was directed by the illustrious Jay Forrester and was funded by the Office of Naval Research (ONR) and the U.S. Air Force.

This machine had such huge dimensions that the building that became its first and only home had to be constructed around the machine as it was being assembled.

The "firsts" that were incorporated into this behemoth are impressive. They included magnetic core storage, magnetic tape and the light gun. The latter looks like a modern hand-held hair dryer and is kept in a bracket mounted to the right of the machine's chest-high circular screened console.

The console's screen reminds one strongly of a port hole. No doubt this was for the benefit of the ONR admiral who was holding many of the purse strings.

18,000 Vacuum Tubes

Moving back in time, we were shown one of the 40 storage modules from the Eniac machine built by the Moore School of Engineering at the University of Pennsylvania. This machine worked exclusively through vacuum tubes — all 18,000 of them.

The operator of this electronic numerical integrator and calculator, used by the Ballistic Research Laboratories in Maryland until the mid-1950s, certainly would not have needed anything to warm his feet.

The last major exhibit consisted of parts of the Mark I machine, completed at Harvard in 1944. The Mark I is considered to be the first practical demonstration of Charles Babbage's analytic engine concept.

This fact has and will be disputed; there were contemporary developments here in the U.S. and in Germany. For sure, however, it was IBM's first real computer project because IBM supplied the money and much of the fabrication skill to Prof. Aiken's project team.

The Mark I relied on hundreds of relays to hold information while its program was introduced, instruction by instruction, via 3-in.-wide paper tape. The full machine was 51 feet in length and must have sounded like a million people eating dry rice with chopsticks out of plastic bowls when it was being operated.

Behind the Scenes

We were by this time well saturated with new interesting facts. Therefore, after a short reverie among the collections of difference engines, slide rules, and sequential analyzers, we were intrigued when we were invited behind the scenes to view the artifacts Merzbach had squirelled away in her private basement library/laboratory.

Here, among the rows of shelves and filing cabinets, we were able to examine an original set of handwritten Mark I operating instructions, inspect reels of metal computer tape and browse through the first Fortran manual ever produced. Merzbach explained the Smithsonian has only about 10% of its collection of almost everything on public display at any point in time. (The rest of its collection of computers is held in a large warehouse in Maryland. However, in order to keep its collection current, new items are constantly being sought. The message that came across in this regard was that ultimately it is the efforts you and I make in preserving our heritage that dictates the completeness of the record we will leave.

Therefore, if you have or if you know the whereabouts of any obsolete item of computing equipment or piece of documentation, the folks at the Smithsonian would like to hear from you. The address is: Dr. Uta Merzbach, Curator, Mathematics Department, Room 5002, Museum of History and Technology, The Smithsonian Institution, 14th and Constitution Avenues, Washington, D.C. 20560.

During our visit behind the scenes that evening, my attention was drawn to an object wrapped in newspapers. It turned out to be a section of memory from an IBM 7090 machine.

The wrapping paper looked very familiar. It consisted of several old issues of — yes you've guessed it — *Computerworld.*

Constable is an independent computer consultant currently working out of Monrovia, Md.

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Final Text Not Yet Ready

Ansi Approves 'Fortran 77' Standard

By Don Leavitt
CW Staff

NEW YORK — The American National Standards Institute (Ansi) completed its work on the new Fortran standard early last month but withheld news of its action since the text of the standard is going through final editing and copies will not be available for another 60 or 90 days.

On the other hand, an Ansi spokesman noted, the substance of the standard is contained in the proposal published by Ansi's X3J3 technical committee in June 1977 and amended in October, largely in response to public comments on the original draft.

With so much work done last year, the proposed standard became popularly known as Fortran 77 and Ansi has agreed to accept continued use of that informal title even though the formal documentation will carry the designation X3.9-1978, he said.

Fortran 77 provides two levels of the langauge: Fortran and Subset Fortran. The subset has been tailored to minimize storage requirements and to simplify the development and maintenance of supporting software. In any case, the new standard replaces both X3.9-1966 (Fortran) and X3.10-1966 (Basic Fortran), the spokesman said.

Although generally compatible with the old standard, Fortran 77 differs in enough ways to make it troublesome to convert programs written in strict compliance with Fortran 66, according to X3J3 chairwoman Jeanne Adams, information services manager at the National Center for Atmospheric Research.

However, she added, many Fortran programs today already utilize language extensions provided by the compiler builders to meet needs unanswered by the 1966 standard. Since the changes in Fortran 77 have the same purpose, they tend to match many of the common extensions, and conversion of an extended Fortran 66 program may be quite simple, Adams said.

The changes include, for example, the introduction of a limited capability for structured programming, she continued, citing the availability now of IF and ELSE . IF statements for branching.

A variety of changes have been made in the area of I/O control; list-directed I/O is defined in the new standard. New statements in support of file manipulation include OPEN, CLOSE and INQUIRE, she noted.

Detailed discussion of the now current standard will be the focus of a technical session at this year's National Computer Conference, she noted, but X3J3 is already gathering material in preparation for the next update of the standard five years hence, called Fortran 82.

'Trace' Aids Datapoint Users

LITCHFIELD, Conn. — The Trace package from Pacesetter Corp. was developed to give the Datapoint Datashare programmer an insight into the actual logic paths taken by his program while it is executing.

To speed debugging, the package gives the programmer the actual labels of steps executed, according to a spokesman. The steps can be displayed on a terminal, written to disk for later examination or routed to a printer if immediate hard copy is needed, the spokesman said.

With such output, the programmer can compare what is actually happening with what was expected. If there is a difference, he can get a better insight into where the problem exists, the spokesman explained.

Trace is available under lease for $375/yr, he said from Pacesetter Corp., Marsh Road, Litchfield, Conn. 06759.

'Look' Adds MVS, TSO Displays

PRINCETON, N.J. — Version 5.0 of Look, the real-time performance measurement system for IBM 360s and 370s running under OS/MVT or OS/VS, includes enhancements for both MVS and Time-Sharing Option (TSO) operations, according to the vendor, Applied Data Research, Inc. (ADR).

Look can be utilized from any operator console, CRT or hardcopy terminal to gain immediate appraisals of what is occurring within today's dynamic DP environments and make changes when appropriate, ADR said.

The package provides performance displays that indicate CPU use, I/O and — for VS installations — paging activity, as well as other displays that help control major subsystems of the operating systems. Resource displays are also available to highlight wait conditions, allocation of devices or data sets and similar activities.

Dynamic system controls are also part of Look, permitting real-time changes in an operational environment to keep it running optimally.

Look 5.0 is said to include new dynamic control commands for MVS users, new performance displays (also for MVS) TSO measurement facilities and extensions to existing Look features. The MVS performance displays provide information about the Auxiliary Storage Manager and the System Resource Manager, ADR explained.

The permanent license fee for Look varies between $4,800 and $6,000 depending on the operating system. The software is also available on lease for three years at $194/mo or for five years at $159/mo, ADR said from the Route 206 Center CN-8, Princeton, N.J. 08540.

Welcome Mat Is Out

Computerworld will publish a special report on systems and utility software in July and invites contributed articles on this topic.

CW is especially interested in tales of user experiences with systems and utility software products and in commentary on the state of the art and where it is going.

What should installations expect from such products? How should they approach acquiring them? What problems are encountered in implementing these products? What services exist to help users?

These are some of the questions we would like to answer in the report. You can help with manuscripts limited to about 1,000 words (four typed, double-spaced pages). Please send them by June 16 to Brad Schultz at *Computerworld*, 797 Washington St., Newton, Mass. 02160.

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Decsystem Users to Meet

CAMBRIDGE, Mass. — Users of Digital Equipment Corp. Decsystem-10s and 20s will be able to choose from among 65 technical presentations and workshops if they attend the 12th semiannual Decsystem-10/20 Symposium at the Hyatt Regency hotel here later this month.

Sponsored by the DEC Users Society (Decus), the May 23-26 meeting will include sessions on data base management, site security, financial topics and transaction processing. User panels will also cover software development and conversions, hardware maintenance and operational considerations, according to Norbert John Kubilus, the Decus Decsystem-10/20 user group chairman.

Mary Beth Peters, an independent organization development consultant, will deliver the keynote address on May 25. A software clinic will be still another part of the schedule for that day, Kubilus said.

The registration fee for the conference is $95 (prepaid) or $115 (at the door). Single-day registrations are also available at a lower cost, Decus noted from 129 Parker St., Maynard, Mass. 01754.

CICS Journal Use Shown

KANSAS CITY, Mo. — "CICS/VS: Journal Control" from the Edutronics Group is the latest course module for programmers, operators and DP managers in the vendor's multimedia series on IBM's CICS/VS teleprocessing monitor.

Journals are powerful CICS/VS facilities available for use in creating and managing special-purpose sequential data sets during real-time execution, an Edutronics spokesman explained.

The course provides a thorough view of journal file management as well as a detailed explanation of preformatting, journal file identification and dual extents, he claimed.

The course module is the most recent release in the new CICS/VS series.

All courses in the vendor's library are available under a variety of rental plans, the costs of which vary with the volume of courses being utilized and the length of the contract. Edutronics is at 3435 Broadway, Kansas City, Mo. 64111.

With Special Feature

'Robot' Gets Broader Data Access

KENSINGTON, Md. — Robot, a query/data retrieval system that enables users to phrase their requests in English, has been extended — through a separately priced option — to support sequential, Isam, Vsam and unloaded data base management system (DBMS) files, according to the vendor, Artificial Intelligence Corp.

Until now, Robot could work only in conjunction with a DBMS such as Software AG's Adabas or National CSS, Inc.'s Nomad. With the Data Access Module, it becomes a self-contained inquiry/reporting system capable of working with data wherever it is stored, a spokesman said.

The Data Access Module includes a utility that makes a pass over each file, creating a read-only "informational" version of the file and an inverted index. The module also includes a retrieval component that Robot uses to access the index and file, the spokesman continued.

The accessibility provided by the module enables users to get at data without having to convert to a DBMS. On the other hand, when a DBMS is being used, subsets of the full data bases can be extracted to meet the specific, immediate needs of the user, the spokesman said.

The optional module will be available in the third quarter for use with IBM's Time Sharing Option or in batch operations. Robot costs $30,000; the module will cost an additional $20,000, the vendor said from 3514 Plyers Mill Road, Kensington, Md. 20795.

Payroll, Personnel Work Runs With 'Q-Pac' System

MANCHESTER, N.H. — The Q-Pac payroll, personnel and labor costing system, now available in the U.S. and Canada from Q-Pac America, Inc., is a modular system intended for use on IBM 360 and 370 equipment, according to its vendor.

By utilizing parameter entries to configure the processing to be done during each payroll run, the system reportedly can be customized to each user's needs without altering the basic source code. This same technique allows a single run of the system to support multiple distinct processing combinations, a spokesman said.

In addition to supporting "unlimited" numbers of earnings and deduction patterns for individual employees, Q-Pac also handles tax calculations.

The personnel portion of the system provides payroll and educational history files for use in skills inventory operations and Equal Employment Opportunity (EEO) reporting.

The labor-costing logic includes backing for an unlimited number of job codes, percentage split on job codes, cost allocation, accrual accounting, cumulative costing and a "universal" general ledger interface, he said.

Initially developed in South Africa and marketed for some time in the U.S. by Software International, Q-Pac operates under DOS or OS or the VS environment.

The package costs range from $15,000 to $30,000 from Q-Pac America, 1 Perimeter Road, Grenier Field, Manchester, N.H. 03103.

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DOCS—Display Operator Console Support—provides the IBM S/360 & S/370 DOS and DOS/VS user with 3277 display unit SYSLOG support. DOCS is simply installed on any DOS or DOS/VS system with no changes required by the user. All 1052, 3210 and 3215 typewriter functions are supported by DOCS with numerous enhancements over a non-DOCS environment. DOCS also enhances DOS/VS operation on S/370, 138, 148 and 158 beyond that provided by the IBM program product.
DOCS is quickly and simply installed on any system. All that the user need do is catalog the DOCS distribution tape to his Core Image library, define where the DOCS hard copy file is to be located and execute DOCS. Total installation time required is under 10 minutes.
DOCS functions concurrently with EDOS, GRASP, DOS/MVT, DOS/RS, POWER II, ASAP, POWER/VS, and ITEL's DOS/VS executing on a S/360 and will enhance the system operation by providing improved facilities for the use of these packages while DOCS is controlling SYSLOG.
DOCS is currently used in over 250 installations world-wide including diverse businesses and US Army bases.
DOCS is available from CFS, Inc. as a licensed program product and may be leased monthly, yearly or on a one-time lease arrangement for $175.00, $1,890.00 and $5,670.00 respectively. All three lease plans include free maintenance for as long as DOCS is installed.

SPEED
DOCS provides significant through-put improvement by the very nature of the speed of the 3277 display unit alone. Operators can even pre-answer messages on the console.

MULTIPLE CONSOLES
DOCS allows from 1 to 16 3277 display unit consoles to be used simultaneously as SYSLOG devices.

MULTIPLE OUTSTANDING REPLIES
DOCS permits messages followed by Reads to the typewriter to remain unanswered without tying up the system. All outstanding Reads are shown in high intensity on the display console(s).

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DOCS does away with any need for the Console Buffering option in DOS or DOS/VS thus providing a savings in the core required by the users' supervisor as well as greatly reducing significant overhead to the entire system. Experience has shown that total through-put improvement with DOCS installed may approach 10% to 20%.

ELIMINATES DEPENDENCY ON TYPEWRITER
DOCS will continue to operate, and allow the entire system to operate, if the 1052, 3210 and 3215 typewriter becomes inoperable. DOCS spools all typewriter data to a hard copy disk file for later printing thus obviating the need for the typewriter to be on-line at all times. Hard copy is asynchronously provided if the 1052, 3210 and 3215 is available. A hard copy listing is also available through a utility program which the user may execute in any problem program partition to list the hard copy file on SYSLST.

NO USER PARTITION REQUIREMENT
DOCS executes in its own pseudo-partition thus allowing the user unrestricted use of the problem program partitions.

MULTIPLE EXTERNAL INTERRUPT KEYS
DOCS provides a separate External Interrupt key for each partition (replacing the use of the MSG command). This is especially convenient for EDOS users. This function is also useful for GRASP users when communicating with a background partition problem program. A unique Interrupt key is provided for each DOS/MVT region.

ACP Million Dollar Club

Send requests for DOCS to CFS. License agreements along with detailed information will be sent by return mail. Inquiries may be directed to:

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John J. Cullinane

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Westbury, LI, NY	May 16
Stamford, CT	May 17
Detroit, MI*	May 23
Boston, MA*	May 30
Detroit, MI	June 7
Chicago, IL	June 14
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Phoenix, AZ	May 11
Dallas, TX	May 16
Cincinnati, OH	May 16
St. Louis, MO	May 16
Louisville, KY	May 17
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Salt Lake City, UT	May 23
Detroit, MI*	May 24
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'IFPS' Utilizes Matrices To Study Financing Plans

AUSTIN, Texas — The Interactive Financial Planning System (IFPS) from Execucom Systems Corp. was designed to answer "what if" questions by working with one or more matrices compiled from user input.

The user defines a model by specifying the source of data for matrix rows and columns and how this data is to be manipulated. The IFPS Executive subsystem lists, copies, combines, consolidates and deletes models and data files.

In contrast, the modeling subsystem drives the analysis and editing of individual models under user-specified commands.

The user can build, edit and maintain data files in a third subsystem while a fourth, the report generator facilities, allows creation and editing of output formats.

Monte Carlo

The Modeling Language subsystem performs risk analysis via Monte Carlo simulations, a technique that entails solving a problem for each set of parameters derived from user estimates or certain distribution functions, Execucom said.

The user can determine probable effects of hypothetical changes in his environment by employing these Monte Carlo solutions as summarized in histograms, a normal approximation table, a frequency table or other forms.

Current IFPS versions run on IBM, Honeywell Information Systems, Inc., Univac, Burroughs Corp., Digital Equipment Corp. and Control Data Corp. CPUs, the spokesman said.

The system can operate in either batch or interactive modes on any CPU with sufficient available memory, a Fortan IV compiler and, for interactive use, suitable time-sharing software, he said.

IFPS costs $28,000 including documentation and the first year's maintenance. Installation and training costs an additional $2,000, Execucom added from 3409 Executive Center Drive, Austin, Texas 78731.

Space Manager Gains Upgrade

BROOKFIELD, Conn. — Version 3.0 of the Adas disk space management package from Universal Software Inc. is said to provide IBM DOS and DOS/VS installations with two additional features: Alternate Volume Allocation (AVA) and Automatic Secondary Allocation (ASA).

The basic software is a transient-driven system that assigns disk space (when a file is Opened) from available areas on a pack, eliminating the manual task of locating unused space.

AVA allows the user to establish "pools" of alternate volumes where files can be allocated if the original pack does not have enough space. These pools can be set up on a system, partition or even a job basis, a spokesman noted.

ASA allocates additional space if the original extent is exhausted, preventing job cancellation for "no more available extents."

Version 3.0 is available now under rental plans starting at $150/mo, the spokesman said from the vendor offices in the Brookfield Office Park, Rt. 7, Brookfield, Conn. 06804.

'OWL' Eases DOS Programming

ATLANTA — The On-Line Without Limits (OWL) package from NCI, Inc. is said to provide unique program development support to users in an IBM DOS/VS environment running under CICS. An OS/VS version is planned for later this year.

OWL permits programmers to have complete freedom in text manipulation; NCI claimed, since its CRT control module allows the programmer to move the display not only up and down to the desired line of coding, but right and left to the particular phrase, word or character of interest, all with a single command.

Another feature — labeled the Toggle Switch — gives the programmer the option of concurrently displaying different areas of a program, file or report in either a full or split-screen format. Direct cursor editing is also an OWL feature, an NCI spokesman noted.

Beyond that, the Dynamic Recall feature provides the ability to summon prior program versions at a single command and to highlight the most recent changes. On the other hand, the spokesman added, a multilevel password system provides a unique security mechanism so OWL's capabilities cannot be utilized by unauthorized people.

Currently the DOS/VS CICS implementation costs $6,450. It can be ordered from NCI, 6075 Roswell Road N.E., Atlanta, Ga. 30328.

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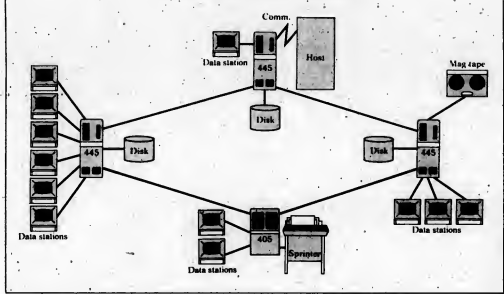

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Technologies Linked — Part I

Economists Given User Languages, Data Bases

By **J. Harvey Trimble Jr.**
Special to CW

The Bureau of Labor Statistics (BLS) has coupled two maturing technologies — problem-oriented languages and the data base approach — into a system that allows the economist who has little or no computer training direct use of the computer as a research tool.

When applied to the problems of storage, retrieval and analysis of economic time series, these two technologies generally complement one another and have been combined by the BLS into a system for data analysis and retrieval of labor statistics [Labstat].

The problem-oriented languages used include Statistical Analysis System (SAS); Statistical Package for the Social Sciences (SPSS); Time Series Processor (TSP); Table Producing Language (TPL); and Macro Data Language (MDL). SAS and SPSS are multipurpose statistical analysis systems that provide a wide variety of statistical operations and substantial data manipulation facilities. TSP is a system for economic analysis and econometric modeling.

TPL is a system for cross-tabulation developed by the BLS and currently in use by nearly 175 other organizations. MDL is a tool developed by the Federal Reserve Board that provides facile interaction with time series data and limited analysis and display facilities.

Collectively, these languages provide a full range of analytical and display services to the economist, yet they require very little or no procedural description of how the problem is to be solved. In other words, once the user has mastered the language syntax, he need only experess the "what is to be done" part of the problem and not "how to do it." This frees the user from dealing with the mechanical computer-oriented aspects of the problem and lets him concentrate on the intellectual aspects.

Several examples of the simplicty of these languages should help provide some insight into how they assist in the analytical process. The two MDL statements to compute over-the-month percent change in the Wholesale Price Index for farm products from January 1976 to January 1978 and create a table of the results are:

```
CHANGE: FARM WUP01 7601 7801
TABLE: FARM 7601 7801
```

The first statement computes the over-the-month percent change in farm products for the period January 1976 to January 1978 and stores the percents in a new time series labeled FARM. The second statement prints a table of the percent change. The language has quite a simple and self-descriptive syntax that facilitates learning and usage.

The SAS statements to perform factor analysis on the annual total U.S. unemployemnt rate, U.S. average consumer price index, wholesale price index for all commodities and total nonagricultural employment from 1960 through 1977 are:

```
PROC FACTOR;
VAR UNEMPLOY CPI WPI EMPLOY;
```

For each variable, these two statements will produce the following outputs: means and standard deviations, correlation matrix, prior estimate of communalities, communality estimates and eigenvalues of the correlation matrix.

Clearly the user must be familiar with the language to understand what will be produced, but given that background, the user can generate a large volume of statistics.

Data Base Approach

The data base approach provides the only missing element to these problem-oriented languages — well organized and uniformly stored data. The Labstat data base contains 66,000 time series from 16 different BLS surveys consisting of more than nine million observations.

Included are series on consumer prices, wholesale prices, employment and unemployment and productivity measures. The data is stored together under the Cincom Systems, Inc. data base manager Total, which permits the direct retrieval of any one of the 66,000 time series.

Thus, interactive access to the data is supported, permitting economists to retrieve and interact with the time series data from any one of more than 160 computer terminals located throughout the BLS.

The languages are coupled to the Labstat data base in such a way that users need not concern themselves with extra steps of retrieving and for-

(Continued on Page 32)

you

and conquer.

without disrupting the flow of data to and from any other node.

Match the workhorse to the work load.
The Sycor 405 and 445 distributed processing systems can be mixed and matched in a Sycorlink network to create individual processing nodes with just the right amount of power for a specific department or location.

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CMG Units Plan Meetings

Two separate regional chapters of the Computer Measurement Group (CMG) are planning meetings at 10 a.m. next Wednesday, May 17. The Northeast CMG will meet at the Mitre Corp. in Bedford, Mass., while the Midwest CMG will be at the GSI Building, 222 N. Dearborn St., Chicago.

The Massachusetts session will hear representatives of Mitre discussing "performance engineering and life cycle management" and a "synthetic benchmark evaluation of a data base management system." A representative of Chase Manhattan Bank will describe the bank's computer production control system, and BGS Systems will outline some case studies in capacity planning.

The Midwest group will hear William Hersh of IBM/Chicago present a tutorial on a simulation technique for modeling computer systems for forecasting, followed by summaries of what various CMG members are doing at their companies.

Both groups welcome anyone interested in measurement and evaluation work and registration fees are minimal, but spokesmen ask attendees to contact them ahead of time to arrange seating and meals.

Midwest CMG can be reached through Stephen A. Gierach, Executive Compumetrics, Inc., 15308 Cherry Lane, Oak Forest, Ill. 60452; the northeast group through Jeff Buzen, BGS Systems, Inc., P.O. Box 128, Lincoln, Mass.01773.

User Languages, Data Bases Linked for Economists

(Continued from Page 31)

matting data to mesh with the requirements of the tool. This coupling is accomplished either within the language itself or externally using another problem-oriented langauge for data base maintenance and retrieval called Tailored Retrieval and Information Management (Trim).

The internally coupled languages are MDL and TSP. Both have a syntax that facilitates conversational sessions, and because of their connection to the data base, they can be used in that fashion from computer terminals.

The externally coupled langauges use Trim to retrieve and reformat data from Labstat into a physical organization that best suits the respective language. Trim permits the retrieval of data from Labstat either by the user supplying a list of specific time series codes or by having the user specify selection criteria for retrieval of a subset of Labstat time series.

In either case, Trim performs the necessary operations to navigate through the data base and to restructure the selected time series into a format best suited for the target language. The Trim statements to couple SPSS, SAS and TPL to the Labstat data base are stored in a common library and are automatically invoked whenever these languages are used.

In his next article, Trimble, who directs the Bureau of Labor Statistics group that developed Labstat, will discuss user reactions to the system.

Patent Data Base Added by CDC

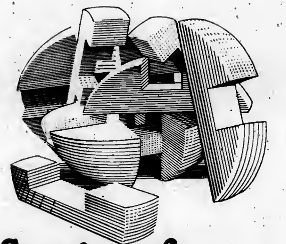
MINNEAPOLIS — A centralized data base for individual inventors in the U.S. and abroad has been added to Control Data Corp.'s Technotec line of network services.

The International Inventor's Registry (IIR) lists patents issued in solar energy, agriculture, food processing and other technologies beneficial to developing nations. To subscribe to IIR, inventors must have a patent issued in one of the above fields.

The patent must be currently recognized by the U.S. or a foreign government and accompanied by an English translation if granted abroad, according to a CDC source.

To record an invention in the IIR, arrangements can be made with CDC headquarters here or with any CDC representative throughout the world.

The cost of listing a patent for one year is $100, the firm said from Minneapolis, Minn. 55440.



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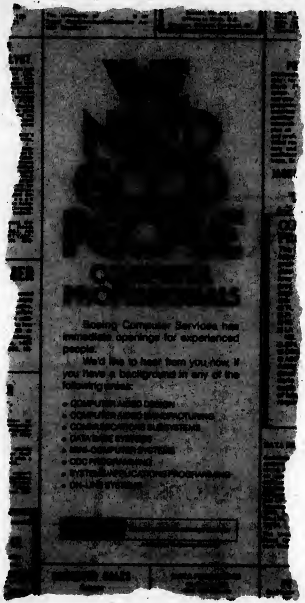

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Checklist Shows if APL Is Suitable Language

By Joseph Schengili
Special to CW

The other day I was asked by a friend how I determine whether a proposed application should be written in APL. My friend manages the systems group of a company that has just installed APL on its computer in Toronto.

He has heard the productivity claims made for APL if used for the right applications. But what are the right applications? As a long-time user of APL, my instinctive reaction to his question was, "Well, it's obvious."

On reflection it is not so obvious. It is a rather complex decision that must take into account current and anticipated user needs, APL installation features, alternative processors, conflicting systems and trade-offs. To come to grips with the issues requires not only considerable knowledge of computer systems, but also firsthand experience in APL programming.

Quite frankly, while my friend manages a small but first-class systems group and has many years of DP experience, his experience in APL goes not much beyond the IBM salesman's pitch on the wonders of VS APL. Yet, as manager of the systems group, he has to direct the use of APL within his company.

After giving my friend's case some thought, I prepared a questionnaire for use in assessing the suitability of APL to any proposed applicaton. This rather simplistic questionnaire is shown here. As you can see, there are 10 questions and four possible answers for each question.

To use the questionnaire, read each question and check the box that most clearly describes the proposed application. Then count the number of boxes checked in each column and multiply each of the four numbers by the appropriate weight 1, 2, 3 or 4.

Finally, sum the resulting values to obtain the APL suitability quotient (ASQ). The lowest possible ASQ value is 10; the upper limit is 40. The higher the ASQ, the more suitable the proposed application to an APL approach.

You can further quantify your decision-making by establishing an APL suitability threshold (AST). The ASQ for a proposed system would have to be equal to or greater than the AST before it could be considered for an APL approach.

Josef Schengili is president of Numetrix Ltd., a Toronto-based consulting firm.

APL SUITABILITY QUESTIONNAIRE

	x1	x2	x3	x4
1. The need for user interaction with the system is:	☐ none	☐ little	☐ high	☐ mandatory
2. Transaction processing volume is:	☐ very high	☐ high	☐ medium	☐ low
3. The run frequency is:	☐ daily	☐ weekly	☐ intermittent	☐ yearly
4. The life cycle of the system is:	☐ two or more years	☐ one year	☐ a few months	☐ one shot
5. The program logic and systems flow is:	☐ trivial	☐ ordinary	☐ complex	☐ very complex
6. The application area is:	☐ tried and true	☐ well defined	☐ innovative	exploratory
7. The system interacts:	☐ heavily with Batch	☐ only with itself	☐ some with APL	☐ heavily with APL
8. The expected CPU load is:	☐ very high	☐ high	☐ medium	☐ low
9. The system completion target date is:	☐ long range	☐ near future	☐ urgent	☐ in panic mode
10. The programmer's experience in APL is:	☐ none	☐ rudimentary	☐ varied	☐ extensive

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Vendor Backs Package Use On Varied Configurations

BERKELEY, Calif. — Argonaut Information Systems, Inc. has implemented its software packages — the A.S.A.P. payroll/personnel system and the A.S.A.P. accounts payable system — on a wide range of hardware, and users have stretched the range even further.

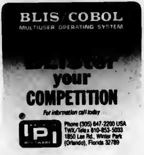
The payroll/personnel system supports more than a dozen pay categories and as many as 20 nontax deductions per employee. Utilizing the Taxbreak module, which is available as a separate package, it handles both federal and state tax calculations including interstate transfers, the firm said.

Labor distribution, Equal Employment Opportunity reporting and personnel history are also managed by the system, which runs on IBM 360/370s, Burroughs B1700/B1800s and B3500/B3700s, Digital Equipment Corp. Decsystem-10s and -20s; Univac 90/30s and General Automation, Inc. GA-16s. This system costs $6,500.

The accounts payable system, which costs $5,000, provides automatic selection of invoices due based on standard vendor terms — but with an override capability in case of need.

It runs on the same range of CPUs as the payroll system with the exception of the DEC equipment.

Argonaut is at Suite 205, 2140 Shattuck Ave., Berkeley, Calif. 94704.



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NATIONAL —SPECIAL LEAR SIEGLER ISSUE—

INFORMER

May 8, 1978

DEMONSTRATORS CONVERGE ON ANAHEIM

Dumb Terminal To Have New Smarter Brothers

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* * *

What has Project X Done with Garry Strohmeyer?

Page 20

* * *

Project X Blueprints Recovered

Page 75

* * *

Are Petrodollars Behind Project X?

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* * *

Ballistic Printer: Tougher in the Long Run

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* * *

Government Denies Involvement With Project X

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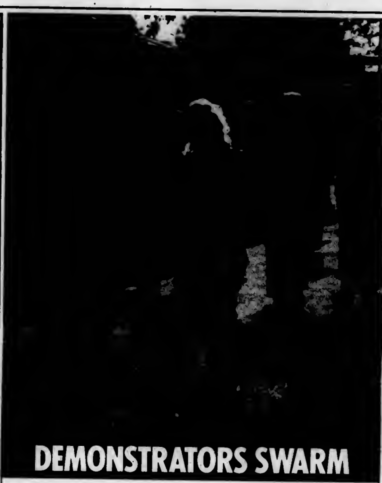

Horde of Anaheim demonstrators, retreating from unsuccessful frontal assault on LSI HQ. Project X personnel remained barricaded inside.

Primed by Lear Siegler's super-secret Project X, and the upcoming National Computer Conference (NCC), thousands of curiosity-seekers, demonstrators, and disbelievers are already swarming into Anaheim.

LSI was caught unawares by the sudden human tidal wave, doubtless spurred by last week's INFORMER exclusive on the project's new ADM 31 and ADM 42 computer terminals. As a result, Lear Siegler HQ has pulled up its drawbridges and is, in effect, under siege. While hundreds of anti-Project X demonstrators parade through its parking lot, LSI continues to work on its clandestine project behind sealed doors.

Initiated as a means to attain complete mastery of this year's NCC, Project X has been from the beginning a mystery wrapped in an enigma. Rumors of two new smart terminals, a stupefying new printer, and even a benumbing data system have filtered down to us here at the INFORMER through various sources, who shall remain anonymous.

Although a tight lid of security had been clamped over Project X, the INFORMER was able to penetrate the cloak of official secrecy surrounding it, and to obtain exclusive information regarding yet another stunning device: the 300 Series Ballistic™ Printer.

Our agent, planted deep in LSI HQ, confirms that the 300 will have a 180 cps, bi-directional capability, will be microprocessor-controlled, and come with programmable formatting. More information was unavailable, as the line suddenly and ominously went dead as our agent was in mid-sentence. Before he was cut off, however, he had been whispering urgently that an optional 2048 character buffer would also be available with the 300. This electrifying option will provide full CRT screen buffering for up to 1920 characters, if our informant's information proves correct, and we at the INFORMER have every reason to believe it will. His last words over the phone were that the wondrous new 300 will, of course, use LSI's already-legendary Ballistic print head.

As sparse as these facts may seem, Project X comes into a little sharper focus with these glistening tidbits of information. It seems clear, as well, that only a corporation of LSI's stature could hope to bring about such a coup in the computer industry as the 300 Series Ballistic Printer. Only a firm committed to providing what users need, and eliminating frivolous bells and whistles, would dare to market devices that are at once cost-effective and highly competitive.

If the ADM 31 and 42, and 300 are only three of the wonder devices nearing completion at LSI, and these are but a few of their attributes, what other mind-wrenching mechanisms does Project X have in store? How will anyone be able to compete with Lear Siegler at the NCC? Is total domination of the industry now Project X's goal? Or will it go so far as to attempt

(Please turn to Page 13, Column 3)

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Shareable Data Bases Key For Effective Mapmaking

By Allan H. Schmidt
Special to CW

Traditionally, maps have been primarily used as descriptive devices to help communicate the results of a study or to include with a report as an illustrative tool. With the advent of computer mapping more than a decade ago, however, the door was opened to use maps, especially thematic types, as a direct part of the analytical process.

Whether it relates to population, land use, soil fertility, health statistics or anything else, the computer-constructed map offers its users the same advantages of data reduction expected of any other graphic representation: It makes readily comprehensible data that would be difficult to interpret in tabular form.

Today there is a growing community using computer-generated maps, with the federal government and educational institutions in the vanguard. Certain federal agencies, such as the U.S. Geological Survey (USGS), the Defense Mapping Agency and the National Oceanographic and Atmospheric Administration, are directly involved with computer mapmaking as one of their principal functions.

Other agencies, such as the Bureau of the Census, perform mapping as only a secondary activity, albeit an important one. Working closely with the various governmental agencies has been, the academic community, typified by Harvard University's Laboratory for Computer Graphics and Spatial Analysis.

Last October, the Harvard laboratory sponsored an "Advance Study Symposium on Topological Data Structures for Geographic Information Systems," cosponsored by the USGS.

Common Approach Needed

In the course of the meeting, attendees recognized the growing need for a more common approach to the design of geographic data bases among organizations having similar needs. Information gathered by any one organization and stored in its data base often could not be applied with any ease or confidence to the needs of other organizations without restructuring or adding information.

True, incompatible data bases are not a unique problem. But, in this instance it proved especially perturbing because so many of the data bases were being developed to support federal or national programs. Clearly it would be beneficial for data base designs to permit their application to any of a variety of geographic programs.

Since the data in question is truly a national resource, we must work toward, improving its accessibility and utility for all potential users on all levels. It takes but a brief glance at a few projects to appreciate the value of common federal cartographic data bases for displaying geographic information in map form.

For example, the Bureau of the Census developed a topological data structure for use in creating its Dual Independent Map Encoding (Dime) files, which describe polygonal features such as city blocks. Inherent in setting up these files were considerations of how to detect and correct errors automatically in the data base at the time of creation and also to permit use of the cartographic data base in computer mapping.

The topological structure finds its primary application in situations involving predefined zones or regions of any size or shape that can be exhaustively partitioned. In this context, users can map not only land use, but also vegetation, health statistics, national boundaries and industrial distribution, for example.

Because of the wide applicability of the topological data base concept, other organizations, such as the USGS, have also adopted it. The USGS is working on a Land Use Mapping and Data Analysis (Lumda) project built on the notion of the topological data strucutre. This file carries all X-Y coordinates needed to plot out land use areas with continuous boundaries across the entire U.S.

For reasons not unlike those of the Bureau of the Census and USGS, Harvard's laboratory has focused its NSF-funded research on the further refinement of topological data structures. This research has led to the development of software to support a geographic information system.

As reported at the symposium, the most significant aspect of this work was the ability to merge, for the first time, two different cartographic data files into a single data base. This capability allows the merging of two or more different subjects that occupy the same region, albeit with different geographic distribution in that region, e.g., land use and soil type. Furthermore, the software allows queries of the newly created, unified data base.

In addition to the topological data structure approach, there is also another school of thought that records geographic information using a gridded data base that relates information to uniform cells superimposed over a given geographic region. In this category falls the National Aeronautics and Space Administration, for example, which has a massive data base produced by satellites.

Certain geographic phenomena — such as rainfall, natural resources and atmospheric conditions — that do not lend themselves to partitioning into finite regions are frequently handled on a gridded data base. At the symposium, several papers discussed the integration of this approach with the topological data structure — certainly another important issue.

With all of the data being collected or already collected by federal organizations, it becomes obvious how much the mapmaking and map-using communities could benefit if only the various data bases had enough in common to allow for a single cartographic definition of various geographic entities.

Clearly, creation of a national cartographic data base would reduce duplication of effort in data gathering and would open new opportunities for the correlation of diverse, but related geographic information. The benefactors of such sharing would extend beyond the federal establishment to such areas as business, industry and education.

Schmidt is executive director of the Harvard Laboratory for Computer Graphics and Spatial Analysis.

Says $100 Unit Coming in Fall

Modem Maker Eyes Cost Breakthroughs

By Ronald A. Frank
CW Staff

ROCKVILLE, Md. — Modem technology is moving in interesting directions that will lead to significant cost savings for users, according to Joseph Scarpa, vice-president of marketing at Penril Corp.

Today's low-speed modems in the 300- to 1,800 bit/sec range typically cost about $325 to $375, but a breakthrough is coming, Scarpa predicted. Penril is working on a modem chip that will give users the flexibility to change transmission speeds and add diagnostics and other options, he noted.

This basic 300 bit/sec modem on a chip will cost "under $100," Scarpa said, adding such a device is not far away at all. In fact, he pointed out, Penril plans to announce such a unit at the Tele-Communications Association (TCA) in late September.

The LSI chip is already available in limited versions and is being supplied to selected customers for operation at 600- and 1,200 bit/sec. Most features and speeds will be added to the basic modem on a chip by plugging in additional circuit boards, allowing users to configure the exact modem capabilities they need, Scarpa said.

Modifying the LSI modems will be a simple matter of plugging in circuit cards, and this will be done by the users, according to Scarpa, who said deliveries of the first LSI modems will begin in about one year.

Small User Support

Penril is interested in providing modem devices for small users, a sector which many products miss because of economic considerations, he said. The company recently introduced a 2,400 bit/sec modem with built-in diagnostics that can provide network monitoring at lower cost for smaller users.

Called the Diagnostic Controlled Modem (DCM), the unit has manual capabilities instead of the automatic diagnostics performed by larger network monitoring systems. The DCM was designed for the smaller user with a network up to 10 or 15 lines or a total of about 170 modems operating on multidropped lines who can usually not cost-justify an automatic diagnostic capability, Scarpa said.

A DCM controller can share diagnostics over four to six lines and provide network monitoring less expensively than other systems, he added. Scarpa said a four-line DCM system with four controllers and 40 DCM remote units, for example, costs $66,088 from Penril; a comparable system from Racal-Milgo would be priced at $81,500.

In general, users can realize a savings of about 25% with the Penril system because the controller is built into the modem unit, he said.

Penril will also unveil at the TCA show a diagnostic controlled, microprocessor-based modem operating at 4,800 bit/sec which Scarpa said will be an adaptively equalized modem. The company introduced a similar unit about three years ago, but it proved to be ahead of its time and never really worked in a polled environment, he said.

The latest device, to be called the 4800DCMM, will be similar to the 2,400 bit/sec DCM, but it will have multiple microprocessors and include more network diagnostic features. A private-line version will be the first unit offered; a dial-up version will follow.

First deliveries of this modem will begin next January, Scarpa said, noting both Bell 208 and CCITT compatibility and the capability to scramble data will be among the modem's features.

Scrambling capabilities will soon become more important to the data user, Scarpa forecast. It would not be unexpected if the National Commission on Electronic Fund Transfers were to require that certain types of data be scrambled to remain secure, he added.

Intelligent Terminal Activated By Users Speaking in English

ANAHEIM, Calif. — Interstate Electronics Corp. has introduced an intelligent voice terminal that enables operators to speak directly to computers, in familiar English terms, via microphones or ordinary telephones, according to a spokesman.

In some cases, such as verifying telephone-entered data, the computer talks back, repeating the words and figures spoken to it or asking for clarification, he added. The terminal significantly increases the overall accuracy of data entered into data bases since errors can immediately and easily be corrected at the source, the spokesman said.

The system operates with a single operator station vocabulary of up to 900 words, or a 250-word vocabulary for each of four channels, or stations, plugged into the same processor, permitting source data to be entered in the terminology associated with the operator's task, he noted.

Further, because data is entered into the computer by voice, coding, keypunching and other manual means of entering data are eliminated, the firm said.

The unit has a flexible control program in high-level language, allowing the user to write his own applications software without modification to the host computer, the spokesman said.

The basic terminal is comprised of an input/operator feedback station, an intelligent controller (user-programmable processor), an asynchronous output or control interface and executive software. It can be expanded to handle up to four user input stations simultaneously, provided with a voice

(Continued on Page 39)

Net Speeding Judicial Process For Florida's Pinellas County

CLEARWATER, Fla. — Heeding the time-honored counsel of the 18th century English jurist William Blackstone that "justice delayed is justice denied," Pinellas County has instituted a computer-based network to help speed and streamline the judicial process in this fast-growing area on Florida's central Gulf Coast.

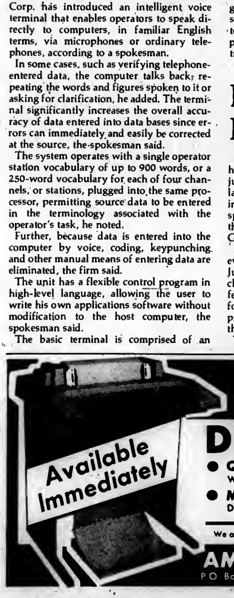
Nearly 60 CRTs or printers are installed in every key element of the Pinellas County Justice Information System — the courts, clerk of the court, state attorney, public defender, parole and probation and law enforcement — allowing officials to follow the progress of every adult offender or case through the criminal justice process.

The system makes use of 34 Harris Data Communications, Inc. 8170 series CRTs with 1,920-character CRT screens and 26 Harris Model 3115 120 char./sec line printers, "with more being added every day," according to Steve Long, system coordinator.

Through a special alert status report, the system automatically alerts court officials to potential lapses in the judicial process by highlighting the names of persons who have not been arraigned or have not been brought to trial within legal time limits.

Similarly, a computer-prepared 24-hour arrest list and a daily jail status report prevents inmates from being "lost" in the judicial system, a spokesman said.

(Continued on Page 39)



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Key-to-Disk System

Net Manages Multiple Sites, Users and CPUs

BEMIDJI, Minn. — At seven locations in the Minnesota State University organization, remote terminal systems are key elements in what officials called a "multinetwork": multisite, multiuser, multiapplication and multi-CPU.

The network uses key-to-disk terminals and card-based remote job entry terminals to provide data entry, batch transmission and output of administrative, financial and student data for more than 30,000 persons in the state university system.

"During the early '70s, our data handling requirements threatened to swamp the punched card and other data entry equipment we were using," Richard Reid recalled. Reid is director of information services for the state system.

Terminal Transactions

After examination of alternative data entry methods and vendors; the Data 100 Corp. Keybatch system was selected and the first installation made here. "Data 100 looked like the best bet. We decided that the overall cost was reasonable, and we were happy with the support reports we got from other users," Reid said.

The current major installations, featuring dual Keybatch/Model 78 systems, are located at the campuses here, and in Marshall, Winona and Mankato. Smaller installations with a single Model 78 are at St. Cloud and the State University Board office in St. Paul. A Model 76 batch terminal is installed at Metropolitan State University in St. Paul.

A typical example of system operation can be found at the DP center at Bemidji State University, one of the earliest installations to use Data 100 equipment. Here, a dual Keybatch/-Model 78 system is on-line to a Univac 1106 in St. Cloud, handling administrative and financial data. This dual system shares a 600 line/min. printer, 600 card/min reader, card punch and 9-track tape drive.

A second Model 78 is on-line to an 1106 in Mankato, providing students and faculty with a program development and teaching facility. This card-based processor has a 600 line/min printer, a 300 card/min reader, punch and tape drive. The predecessor to the Data 100 systems was an IBM 1404 and numerous keypunchers and verifiers.

At the present time, according to Ed Nettestad, director of computer services at Bemidji, there are eight CRT data entry keystations on the Keybatch with four located in the data entry room, one in the terminal room used primarily as a supervising unit, one in the accounting office, one in the financial services office and one in the registrar's office.

Nettestad said the increased data handling capabilities of the dual system have enabled the university to add many jobs to the production schedule. Some departments have doubled the size of their files, which requires faster and more frequent update and report generation.

Training Simplified

Experienced and inexperienced keystation operators have achieved more productive and accurate work habits with Keybatch compared with punched card data entry, Nettestad said. Training of operators has been simplified immensely and operator accuracy rates are very high, he added.

"It's easy for the operators to catch errors because of character, field and record checks the machine makes," he said. Operators can complete a record with fewer keystrokes than before because data constants are automatically entered on a record.

The keystations process each keystroke faster than before and different formats are more easily accessed, he noted.

At Winona State University, computer center director David Forsythe explained his philosophy: "I try to use the computer to its fullest extent to maximize machine efforts and minimize manpower efforts."

Winona State has a configuration similar to Bemidji's, with a dual Keybatch/78 processor on-line to St. Cloud handling administrative and financial data and a Model 78 used by students and faculty. These systems replaced Mohawk Data Sciences Corp. and Honeywell Information Systems, Inc. equipment.

"Keybatch is the kind of system you can push a long way," Forsythe said. He and his staff have developed numerous software packages to enhance and streamline data entry and processing.

Formerly about 80 punched cards containing variable data had to be keypunched and changed daily. The program developed by Forsythe's staff cut the number of cards to one or two. The program fits the data from the cards into the job stream, generating the job control statements that control execution of the program in the mainframe.

The system also includes automatic

(Continued on Page 40)

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Interstate Electronics Has Voice-Input Terminal

(Continued from Page 37)

synthesizer audio response unit and accommodates a number of optional features for computer interfacing, I/O peripherals and mass storage.

Single or multiplexed four-channel Ascii interfaces allow completely interactive operation with "virtually any modern computer or information processing system," the spokesman said.

With Interstate Electronics' telephone compatibility, option, a standard telephone headset becomes a direct voice link with the host computer.

Pattern Classifier

The heart of the voice terminal is an acoustic pattern classifier that produces a digital code in response to a received utterance. The classifier consists of a spectrum analyzer, an analog multiplexer and a analog-to-digital converter, a programmed digital processor, a reference pattern memory and an output interface.

The word boundary detector serves to establish the start and end of each utterance by "experimentally determined criteria." During the training period, the operator repeats each vocablulary word.

After the system has been "trained" to a particular operator's voice, each new pattern from the coding compressor is compared with a syntactically determined subset of all the previously learned reference patterns in memory, the spokesman said.

Accuracy at 99%

At present, the terminal is being tested in a variety of applications by a number of companies; other firms have already put the terminal to work, the vendor said.

In any application, according to Interstate Electronics, the recognition accuracy of the terminal is in excess of 99%. In addition, its syntax processor allows organized vocabulary lists for specific interactions so a rejection rate of 90% to 98% of invalid inputs, including extraneous noise, is achieved, the company claimed.

Price for the basic terminal is $18,750 including software and documentation. Interstate Electronics is at 707 E. Vermont Ave., P.O. Box 3117, Anaheim, Calif. 92803.

Net Speeds Judicial Jobs

(Continued from Page 37)

"This is a total on-line system that uses a single data base and eliminates most of the manually prepared forms that formerly took days to move from one point to another," according to Harold Mullendore, clerk of the circuit court

Information is entered directly into the county's central IBM 370/155 from terminals at user locations. This data is consolidated into a comprehensive status report of the individual or case, providing up-to-date information for authorized users anywhere in the system.

Key elements of the system are a computer-prepared court calendar, a case progress docket and a case status summary. For parole and probation functions, the system lists parole officer caseloads with the ability to transfer one, more or all cases between officers.

In addition to automated booking procedures, law enforecement officers can check the computer for outstanding wants or warrants, either local, state or federal.

The system's reconfigured International Communications Corp. (ICC) Model 4600/48 modems, running at 4,800 bit/sec, have been "very reliable," according to Long. "We've had excellent success with them. They've been tremendous."

Front-ending the system is an IBM 3704 communications controller. Teleprocessing software is IBM's CICS, with Btam and Vsam. All programs are written in Ansi Cobol, Long said.

To help ensure data security and protection of information within the system, all users must identify themselves with special passwords. Also, any changes to a case or an individual's records are identified by who made the change, and the date and nature of the change.

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Processor Lets College Expand Net, Cut Costs

WARWICK, R.I. – Rhode Island Junior College here has increased the number of terminals its system can handle and decreased the cost of adding communications lines by installing a Memorex Corp. 1380 communications processor.

The 1380 has also reportedly improved system checkout and made line switching a simple keyboard entry operation.

The Department of Computer Resources at the college serves a student body of approximately 10,300 at two campuses. At the main campus, the department runs five CPU partitions under DOS/VS on a 1M-byte IBM 370/138 CPU.

At the second campus is a 96K (16-bit word) Digital Equipment Corp. PDP-11/34 system.

Terminal Transactions

The complementary computing systems of hardware and software within the department are currently providing instructional interactive problem solving, using Basic Plus and Fortran IV; on-line inquiry and data entry for a variety of data base files, using IBM's CICS/VS with Cincom System, Inc.'s Total; computer-assisted instruction including remedial or tutorial classroom presentation, using IBM's Coursewriter III; and other applications.

According to Paul Bartolomeo, director of the Department of Computer Resources, "When we reached the full capacity of our hard-wired terminal controller at 96 lines, we began shopping for more versatile equipment. We discovered that by leasing a Memorex 1380 communications processor, we could handle a maximum of 240 terminals and do it at less than our current costs."

A teleprocessing partition uses approximately 30 lines for administrative inquiries into the college's student-oriented data base. The data base consists of 13 Total files and contains the full history of student activity at the college.

All major offices and departments have terminals that permit access using CICS/VS to the data base under certain file security restrictions.

Fitted into the DP operations are two background partitions for production batch processing such as payroll and accounting records for the college as well as a large local school district. Additional processing is performed for the second campus in Lincoln.

It is planned that the PDP/11 system will be used, along with its mathematics problem-solving network, as remote job entry station to the 370/138 with the Memorex 1380 handling communications over leased lines.

"With our multiplexed communications between the two campuses, the CRT console on the 1380 gives us a better way to check the system up and down the lines and to determine vendor responsibility whenever a problem occurs. The communications unit makes it easy to display what is going on with a communications line or to switch lines internally without bringing the system down," Bartolomeo said.

Network Serves Multiple Users

(Continued from Page 38)

report generators and automatic file loading, which ensures that a batch enters the proper file on the 1106 without intervention by the operator, Forsythe noted.

At Southwest State University, where the Data 100 equipment replaced a 32K IBM 1132 system, Director of Computer Services Duane Herrick keeps five keystations in the computer center to handle processing, with a sixth keystation located in the business office.

"The volume we can handle in a day has increased tremendously," Herrick said. "Before, the operators were continually buried." The volume at Southwest, the smallest of the state schools, amounted to 20,700 separate runs on the administrative Keybatch system last fiscal year and 11,000 runs on the Model 78 that handles student and faculty programs.

This "academic" system has been a closed shop operation, with students and faculty handing their source documents to DP center personnel. Later this year, however, the Model 78 will become a hands-on tool for academic users in computer language teaching and software writing, Herrick added.

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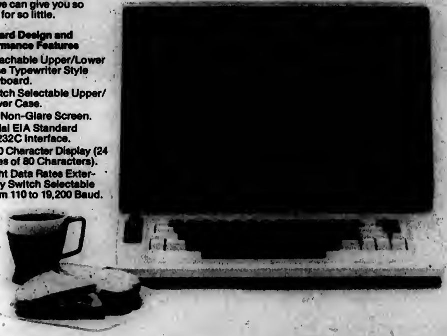

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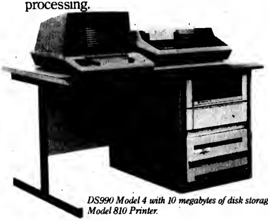

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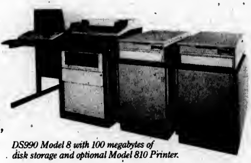

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TEXAS INSTRUMENTS.

Plasma Display Works in Rugged Environment

ANAHEIM, Calif. — A second-generation, rugged-environment plasma display terminal is available from Interstate Electronics Corp.

The PD 3000's software includes a real-time, high-level macroinstruction set that provides subroutines for display control, alphanumeric display, incremental and vector graphics. Custom software and engineering are also available, Interstate said.

Features of the PD 3000 include standard alphanumeric and graphics capability, inherent panel memory (requiring no refresh), single-point write/erase, constant spot size, low operating voltage (less than 150V and a no-flicker image. The terminal has standard Ascii keyboard commands for the operator, dual EIA RS-232C compatible interface ports and optional high-speed parallel I/O facility, according to a spokesman.

Utilizing a 16-bit parallel high-speed microprocessor with a 330 nsec execution time, the unit is able to write a worst case (longest) vector line in 10 msec. Normal address rate is 50,000 dot/sec on a 512 by 512 line display, an official said.

The plasma display terminal consists of six functional replaceable modules including a plasma panel, drive electronics, control electronics, display processor containing interfacing circuits, power supply and keyboard.

The terminal operates by receiving signals from an external CPU or its own keyboard, then interpreting the signals and displaying commands received, performing the addressing, formatting and control operations required and displaying the requested functions on a plasma panel, Interstate said.

Optional capabilities include high-speed parallel I/O (190,000 char./sec), additional function key controls, touch panel, special keyboard, random-access memory installation and read-only memory expansion for programmable character set, scrolling, editing, high-speed data storage and hard copy, the firm said.

Interstate said it supplies the user with comprehensive software that includes subroutines for display control, alphanumeric display, incremental and vector graphics.

The software package is available in computer-independent macroinstruction set, a Fortran IV and Dartmouth Basic display library and a Fortran IV terminal exerciser. A programmer's quick-reference summary guide is included.

Cost of the PD 3000 is $12,000 from Interstate Electronics Corp., 707 E. Vermont Ave., Box 3117, Anaheim, Calif. 92803.

AT&T to Extend Dataphone Link To Six Cities

BEDMINSTER, N.J. — AT&T will expand its Dataphone Digital Service to the first six of 42 additional cities scheduled for the service.

In a filing with the Federal Communications Commission, the company said the six cities are Tulsa, Okla.; Seattle, Wash.; and Anaheim, Inglewood, Mountain View and Oakland, Calif.

Currently available in 24 cities, Dataphone Digital Service is a private-line digital data communications service operating at five speeds between 2,400 bit/sec and 1.544M bit/sec.

The 42 additional cities were approved for the service by the commission last March and all are scheduled for operation by early 1979.

Course to Focus On DDP Design

NEW YORK — The Yankee Group will sponsor an intensive two-day seminar entitled "Telecommunications Networking Strategies for Distributed Processing Applications" here May 24-25.

Among the speakers will be Dr. James Martin, who will discuss a technique he helped develop that automates the data base design process.

The goal of the seminar is to provide specific implementation experiences that should help users avoid the pitfalls of others and to "elucidate the migration paths from here to there" in implementing distributed processing, a Yankee Group spokesman said.

Other featured speakers include Dr. Dixon Doll of the DMW Group, Burleigh Cook from Fairchild Camera & Instrument Corp., Ray Topkis of Equitable Life Assurance Society and Howard Anderson of The Yankee Group.

Price for the seminar is $550 for an individual and $450 for each additional attendee from a company. More information is available from The Yankee Group, Harvard Sq., P.O. Box 43, Cambridge, Mass. 02138.

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Megatek Graphics System Features 32-Bit CPU

SAN DIEGO — Megatek Corp. has announced the Megraphic 7000 series of intelligent refresh graphics systems and terminals that feature longer graphic word length, a 32-bit bipolar, bit-sliced microprocessor, self-contained refresh memory, a "more versatile" interface and "advanced" expandable hardware, according to the firm.

The interactive graphic system delivers performance available only in machines costing 40% more, a spokesman claimed.

An interface enables the Megraphic 7000 to be connected to Digital Equipment Corp. PDP-11 minicomputers in addition to Data General Corp.'s Nova and Eclipse, with which the existing Megagraphic 5000 is compatible, according to the spokesman.

The "advanced hardware" features allow the addition of such optional features as rotation, zoom, scale and clip as well as standard features such as hardware blink, translation and dashed lines, the company said.

Basic System

The basic graphics display system includes a rack-mountable chasis with 12-slot mother board, graphics processor and vector generator, 2K of 32-bit-word random-access refresh memory and a direct memory access (DMA) interface to the user's host CPU.

Standard DMA interfaces and software modules are available for DEC's PDP-11 Unibus and Data General's Nova and Eclipse minicomputers, according to the company. A universal interface, which provides the logic required for the 1000's internal bus structure, simplifies connection to other minicomputers, the firm said.

A full complement of interactive devices such as data tablets, joysticks, light pens and digitizers is available, according to the spokesman. An intelligent input peripheral control unit services these devices, reducing the burden on the host CPU, the company said. Incremental and electrostatic plotters are available for hard-copy output.

A Megraphic 7000 system can be made compatible with Tektronic 4010 and 4014 Series terminals, the firm said.

Available Software

The Megraphic 7000 is shipped with software commensurate with the hardware configuration. The standard Megatek Graphics Software (MGS) features Fortran-callable graphics subroutines.

Included are capabilities such as selective erase, clipping, windowing and zoom.

The Megraphic 7000 is currently in production. Prices start at $20,000 to $25,000 from the firm at 1055 Shafter St., San Diego, Calif. 92106.

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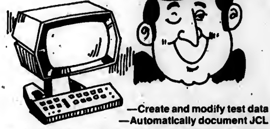

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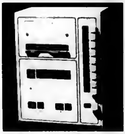

The SMART CLOCK is a programmable microprocessor-based data collection terminal which collects information for Time and Attendance, Inventory Control, Job Costing, Security Access, and other custom applications. The SMART CLOCK will easily interface with virtually any type of processor. It can operate in either a real time/on-line or a stand-alone mode. In the stand-alone mode, the terminal collects information completely independent of the host processor. Typically, a day's worth of data can be stored in RAM Memory and later transmitted to the host processor in a few seconds. An internal lifetime battery provides back-up during power failures.

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Firm Providing Reports on FCC

BOSTON — A monthly reporting service on Federal Communications Commission (FCC) activities in the regulation of voice and data communications is available from Economics and Technology, Inc. (ETI).

Called "FCC/Watch — Telecommunications," the service includes a binder containing "Overviews" of FCC dockets on major voice and data issues, an ETI spokesman said.

Monthly updates provide a chronological listing of docket-related "Event Summaries" reporting all FCC, court and legislative actions plus related comments extracted from more than 60 news and trade publications, the firm said.

All research and reporting is performed by ETI's telecommunications economists, engineers and analysts, according to the spokesman.

Issues covered in the publication include tariffed products and services such as the multipoint private line (MPL), Dataphone Digital Service (DDS), Message Telephone Services (MTS), Execunet, MPL, Wats and Mobile Telephone Service (MTS), as well as long-standing issues such as the AT&T antitrust case and the Computer Inquiry, the spokesman said.

The 12-month subscription fee for the service is $275. ETI is located at 101 Tremont St., Boston, Mass. 02108.

Telxon Has Wand Option

BATH, Ohio — A wand scanning option is now available with Telxon Corp.'s Model 717W portable data entry terminal. This system features a pen-type optical scanner weighing less than 4 oz.

When the wand's optical tip is swept across the bar code label, the coded information appears briefly on the readout and then is stored in the solid-state memory, according to a spokesman.

The wand can read Plessey and Codabar codes at speeds from 3- to 30 in./sec, the firm said.

Additional data can be entered into the Telxon 717W system via the hand-held terminal's keyboard, allowing both wand and keyed data to be subsequently recorded in the 717's 32K random-access memory, a spokesman said.

The overall system can record information for subsequent data transmission over ordinary telephone lines to a centralized location for processing.

Price for the 717W terminal with wand option is $1,350 from the firm at Ghent Sq., Bath, Ohio 44210.

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Double the Previous Power

Mohawk Adds Top-of-Line DDP System

PARSIPPANY, N.J. — Mohawk Data Sciences Corp. (MDS) has introduced the most powerful member to date of its Series 21 distributed data processing (DDP) systems.

The System 21/50 is hardware- and software-compatible with the 21/40, MDS' previously most powerful model, but the 21/50 offers twice the processing speed, twice the memory and twice the local file storage capacity of the System 21/40 and the entry-level System 21/20, MDS claimed.

The 21/50 utilizes multiple microprocessors and an interlaced memory system, a spokesman noted.

A "virtual" keystation allows the system to handle up to three concurrent tasks, including one "background" task such as batch communications with a host CPU or media conversion, he said. A System 21/50 with one operator station can handle one foreground and one background task concurrently, he added.

The system can execute programs written in Mohawk Business-Oriented Language (Mobol), an English-like language compiler that permits custom validation during source data entry or multifunction local processing. Mobol programs written for the System 21/40 will also run on the System 21/50.

Major components of the 21/50 include a 250 nsec CPU, one to four operator stations, one to four diskette drives and peripheral devices including printers, magnetic tape drives and hard disk drives.

The controller console houses the CPU, main memory expandable from 64K to 128K in 32K-byte increments, integral diskette and hard disk storage and all of the electronics required to support the operator stations, including peripheral device controllers and data communications adapters, the spokesman said.

Mohawk Data Sciences System 21/50

The controller console can accommodate four diskette drives with capacities of 242K bytes each or two diskettes and an inte-

(Continued on Page 48)

Used Systems Cited as Upgrade Option

By Frank Vaughan
CW Staff

PENNSAUKEN, N.J. — Users of medium- and large-scale systems rarely switch to an incompatible product line because of heavy investments in software. In today's market, however, this does not mean users have no alternatives when they need to upgrade, according to a report from Auerbach Publishers, Inc.

The report, "Snapshot of Used Computers," notes that an IBM user, for instance, can obtain IBM CPUs not only from IBM, but from third-party leasing firms, used computer brokers and dealers, as well as from "plug-compatible" processor vendors.

Users of other manufacturers' systems do not have plug-compatible processors as an alternative, but they can also deal with third-party leasing firms and used computer brokers, the report stated.

"DP managers who have upgraded or converted to new hardware are saddled with the problem of what to do with previously purchased but unneeded hardware. The used computer market represents the only way to sell for cash, considering that the alternatives are simply scrapping the machine or donating it to some nonprofit institution, perhaps as a tax-deductible gift," Auerbach pointed out.

"Many DP executives are becoming aware of the advantages to be gained through buying or selling on the used equipment market. For the buyer, on the other hand, the potentially huge cost savings in used hardware acquisition may justify the risk and effort," the report noted.

The report covers three broad topics related to used computers: the advantages and disadvantages associated with used equip-

(Continued on Page 48)

Offshore Data Conversions Cheaper

By Norman Bodek
Special to CW

GREENWICH, Conn. — As personnel costs skyrocket, more and more firms are sending very large data conversion projects overseas in an attempt to reduce those costs.

Firms have found it is expensive to automate large manual files on a one-shot basis. A company would have to obtain the additional equipment and hire extra people on a temporary basis just for the conversion. After the conversion, the problem would be what to do with the extra equipment and people.

But firms going overseas for data conversions have different concerns — primarily accuracy, turnaround times, loss of source material and language barriers.

As in dealing with any outside vendor, it is up to the user to ensure and specify the highest degrees of quality. Most "offshore" companies offer fantastic accuracy guarantees ranging from 99.5% to 99.95% or higher.

It is up to the company ordering the conversion to determine just what these guarantees mean. There is a great difference between errors on strokes or errors on records. An accuracy guarantee of 99.5% on strokes would mean one error out of 200 strokes; the same guarantee on records would represent an error rate of one out of 8,000 strokes.

Once the user understands the accuracy guarantees, methods can be developed to ensure the accuracy. For example, vendors could be financially penalized for not meeting accuracy guarantees or could be required to reverify the entire work until standards are met.

It is not too difficult to program and select a random sample of the received data, visually checking the results against the original source material to determine the accuracy. Also, the vendor's track record could be checked by calling past clients.

Loss of Material

Loss is another potential problem that can be eliminated. Usually only copies of the original material are sent overseas. The best and least costly method of copying the material might be microfilming, which can be done at the user site with a minimal

(Continued on Page 48)

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Used Systems Provide Upgrade Alternatives

(Continued from Page 47)

ment; the market; and guidelines for both buying and selling used hardware.

IBM's "used" computer base consists of about 68% of its installed base of approximately 75,700 systems, the report said. It broke down the base as follows:

- About 10,000 installations of 370/-135, 145, 155, 165 and 195 systems.
- About 22,600 installations of the System 3 models 6 and 10.
- About 13,300 installations of 360 systems (first delivered between 1965 and 1971.
- About 3,200 installations of the 1130 (first delivered in 1966).
- About 1,300 installations of the 1401 (including the 1401, 1401G and 1401H).
- About 900 other installations, including the 1410, 1440, 1460, 1620, 7010, 7030, 7040, 7044, 7070, 7074, 7080, 7090 and 7094 (first delivered between 1960 and 1963).

"There are about 38,400 non-IBM installations, including both 'new' and 'used' systems — a total number significantly lower than the total of about 51,300 'used' IBM computers," the report claimed.

In the section on "Risks and Rewards of Used Equipment," the report noted there are only a limited number of options available to users considering ways to dispose of excess hardware.

Hardware rarely commands more than a few hundred dollars in scrap metal value. Although some of the earlier first-generation machines with mercury-delay lines may fetch somewhat more, scrap value rarely covers more than removal costs.

Donating old equipment to a nonprofit institution can gain the user's organization some favorable publicity and goodwill, but few tangible economic benefits, the report said.

Selling — if a buyer can be found and the selling value is higher than the scrap value — provides a virtually risk-free alternative, Auerbach suggested. There are, however, substantial difficulties in selling used equipment, even with the aid of a broker, it warned.

"For the prospective buyer, the advantages of the used equipment market are not so readily apparent and are far more difficult to evaluate," the report contended. The prospective buyer must consider the financial impact of purchasing used equipment, as well as examine a number of noneconomic factors such as reliability, maintenance, the risk of technological obsolescence, the reactions of key personnel and scheduling and configurations.

Used System Market

The "Snapshot" also provides information on "used" systems, that is, systems first delivered five or more years ago and since replaced by newer versions or an upgraded product line and released from their original leases.

The report's coverage emphasizes IBM, with detailed reports on the 370/135, 145, 155 and 165 and on the System/3 models 6 and 10 as well as popular older systems from other manufacturers such as the Burroughs [Corp.] 700 family, the Honeywell [Information Systems, Inc.] 6000 series and the Univac 9000 series."

The report sells for $39.95 from Auerbach at 6560 N. Park Drive, Pennsauken, N.J. 08109.

Cheap Conversions Found

(Continued from Page 47)

disturbance of the working files.

Microfilm offers protection against loss, and a user can always visit the vendor's site and determine that the work is safeguarded and understood.

Some overseas companies are offering seven-day completion of the work. Others need a minimum of two to three weeks to turn around the data. The limiting factors for the user are time lost in shipping the data and the size of the project.

The language barrier can be a problem, but many of the "offshore" companies are in English-speaking areas. Problems in this area will most likely arise on jobs that require interpretation by the operators and a knowledge of English. If the vendor is given ample time, the operators can generally be properly trained on most jobs.

Most of us are creatures of habit and like to follow the way that has served us best in the past. We are very reluctant to experiment with something new, such as sending work overseas. However, today there are probably over 2,000 operators in foreign lands keying work exclusively for American companies.

Bodek is president of Norman Bodek & Associates, an independent consulting firm. He is also president of the Data Entry Management Association.

Mohawk Line Gets More Power

(Continued from Page 47)

gral disk drive able to store up to 20M bytes.

Operator stations include 1,920-character CRTs and movable keyboards available in data entry or typewriter layouts.

Binary synchronous and synchronous data link control protocol adapters will be available for use on the System 21/50, which supports remote batch communications with host CPUs via IBM 2780/3780 protocol.

The system reportedly supports concurrent communications in background mode at speeds to 4,800 bit/sec and freestanding communications to 9,600 bit/sec.

An entry-level System 21/50 configuration leases for $477/mo, including maintenance, on a one-year contract. It sells for $14,950. Such a system includes a controller console with 64K bytes of memory, one operator station and one diskette, the firm said.

A 64K-byte System 21/50 with two operator stations, one diskette drive, 10M-byte fixed disk, a 45 char./sec printer and communications interface leases for $657/mo on a three-year contract, plus $176/mo maintenance. It sells for $30,821.

A four-station System 21/50 with 128K bytes of memory, two diskette drives, 20M-byte fixed disk, 340 line/-min printer, 25 in./sec magnetic tape drive and communications interface leases for $1,225/mo on a three-year contract, plus $343/mo maintenance. It sells for $58,869.

Deliveries of the System 21/50 are expected to begin in the fourth quarter from the firm at 1599 Littleton Road, Parsippany, N.J. 07054.

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Data Entry Dimensions

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ARLINGTON, Va. — Rehab Group, Inc., a four-year-old service firm based here, is using a high-throughput, 32-keystation distributed data entry system to meet the demands imposed by a need to input hundreds of thousands of raw documents each week.

At the same time, the use of distributed data entry has allowed the firm to significantly cut its cost per keystation compared with other types of data entry systems.

Typical of the large-scale data entry jobs that Rehab handles is an ongoing project for the Immigration and Naturalization Service (INS). Rehab is updating the agency's files on foreign nationals visiting the U.S. for extended periods of time.

The company takes the basic data in the form of immigration cards collected at various ports of entry throughout the U.S. and produces an updated listing on magnetic tape for INS' data base on aliens. Any information missing from the entry cards is noted in an exception listing run off on a line printer.

To handle this task and other production chores, Rehab uses a Pertec Computer Corp. CMC Division CMC 1800 Keyprocessing system with 32 keystations, a 300 line/min printer, two disk drives, two 1,600 bit/in. tape drives and one 800 bit/in. tape drive.

Before installing the Keystation system, Rehab had considered using its time-sharing system for data entry as well as regular time-sharing chores.

However, the time-sharing system could not meet the data entry throughput demands made by applications such as the INS job, according to the firm.

Essentially, the difference came down to system response to operator errors. In the case of the CMC system, Rehab said, 'system response was instantaneous, allowing errors to be corrected as data characters were keyed into the system.

In the case of the time-sharing system, however, error correction had to wait until an entire record had been keyed. "This increased system overhead and cut throughput substantially," according to Surinder Dhillon, Rehab's president.

"With the CMC 1800, however, throughput had ceased to be a major concern," he added, noting that "multiterminal general-purpose computers simply can't compare with distributed entry systems in this regard."

Edit Checks

The system also gives Rehab the benefit of edit checks that allow operators to verify alpha or numeric data, ranges and other values. These checks are integral to the CMC 1800 system; while they could have been added to the time-sharing system, a Digital Equipment Corp. Decsystem-10, extensive software modifications would have been required.

"That would have cut throughput further by increasing the amount of data communications control needed to process the job, Dhillon noted. "With the 1800, however, everything is right there."

Aside from system performance, several other factors were considered when it came to choosing data entry hardware. The first was service.

"We have been very pleased with the way CMC handled the system once it was installed," Dhillon said. "We have had a little downtime, but nothing that wasn't fixed in a matter of hours."

The vendor also helped out with the software. "It was always there when we needed help," he recalled.

Problems to Hurdle

But overall, achieving the high-volume data entry production was fairly routine for Dhillon, who has had to overcome many problems, both business and personal. Dhillon's private life offers a striking example.

At the age of 16, Dhillon was in an automobile accident that left him riddled with broken bones. Severe rheumatoid arthritis set in after four years in the hospital, leaving him totally disabled except for some control over his left arm and the fingers on his right hand.

After several years of medical rehabilitation, Dhillon enrolled in a self-study program at George Washington University in Washington, D.C. training at home with a used computer he bought for $100.

With the terminal, he gained enough expertise as a programmer to win a few contracts from some small local companies. From there, Rehab has grown to a $5 million operation occupying five floors in two buildings here.

Customers are now primarily federal agencies including the Department of Health, Education and Welfare, the General Services Administration and the Nuclear Regulatory Commission.

Starting with his first programming work, Dhillon has expanded Rehab to offer a full line of services including

(Continued on Page 52)

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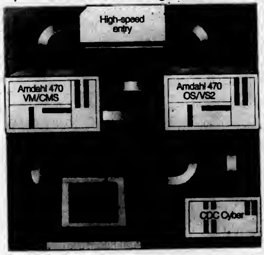

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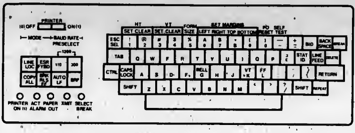

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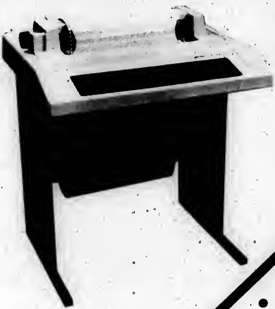

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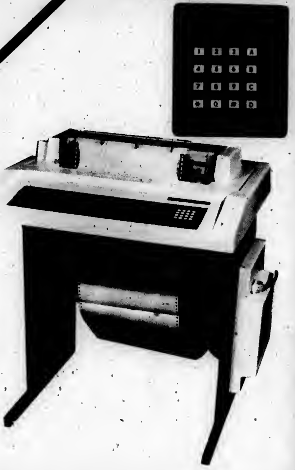

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With CPU Tracking

Group Can Predict Cow's Life-Span

By Frank Vaughan
CW Staff

BRATTLEBORO, Vt. — A nonprofit organization is using a medium-scale, virtual storage CPU to predict the life span and milk production of Holstein cattle. The organization also records information for a subsidiary that exports cattle and frozen semen to foreign countries.

The Holstein-Fresian Association (HFA) of America is a membership organization of dairy cattle farmers that keeps some 20 million records on 6.5 million animals. The data is kept on a linear set of tape files and is processed on an IBM 370/135, according to Abbott Fisher, superintendent of the computer division.

The system, which operates under DOS/VS, is currently configured with six 3420 tape drives, four 3340 disk drives, a 1403 printer, a card reader and punch. It has 144K bytes of memory with 52K bytes waiting to be installed, Fisher said.

In-House Processing

The records were created in-house for the most part, Fisher explained, noting the bulk of HFA's applications center on the registration and transfer of animals. This data must be entered into HFA's animal registry, which maintains the identities of 11 million registered Holstein cattle dating from the first importation of the breed nearly 100 years ago to the current generation.

The second largest chunk of processing comes from the classification program in which HFA preprints classification sheets that are taken into the field by a force of 22 people who score animals on their physical conformations. This information is then keyed in the performance records department and entered into the system, Fisher said.

"We receive data from 10 computing centers around the country. This consists of production records from certain cattle owners who want to participate in our production testing program," Fisher said. "Four times a year we also receive from the U.S. Department of Agriculture data on another group of cattle in a less stringent test program. This usually consists of between 500,000 and 600,000 records,"

Using a medium-scale CPU, dairymen can predict the milk production of Holsteins.

Cow Index

"In addition, we receive a cow index record that is computed for the production on cows, which is about 750,000 records a year. There is also a twice-yearly summary on bulls put together with type summaries computed here and published for the industry in booklet form," Fisher explained.

Once the computer establishes which animals should produce the most milk for the longest period of time, those animals can be selected by farmers for breeding, HFA said.

Commercial Subsidiary

Besides being a nonprofit enterprise, HFA owns a commercial subsidiary for exports. If a country sends the subsidiary certain specifications, requesting a number of cattle whose parents meet certain standards, the CPU can be used to produce a list of the cattle and their owners.

99% Uptime

Fisher noted reliability is a "critical factor" in HFA's operations and with the 370/135 he "finds we have it." The CPU is currently running slightly more than two shifts a day and is powered down between shifts.

In the four and a half years the CPU has been in use, it has had a downtime of "less than .5%"

Firm Disperses Data Entry Work

(Continued from Page 50)

applications, systems and telecommunications programming, facilities and data base management, real-time and turnkey systems, network analysis and planning, a wide range of educational and training services and, of course, large-scale data entry work.

40% Handicapped

Rehab is also very active in work involving the handicapped, and more than 40% of the company's 200 employees are handicapped.

Dhillon anticipates he and his company will become more involved in work with the handicapped. He is not, however, planning to be handicapped any further by the demands of large-scale data entry jobs.

"The CMC 1800 system has worked out so well," he said, "we're planning to add more."

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Reads Salesmen's Reports

Optical Scanner Shines Up Wax Maker's Sales

Special to CW

RACINE, Wis. — By using an optical mark reader to scan its salesmen's call reports, the Johnson wax company here is reportedly getting valuable retailing information from points of sale a lot faster, enabling sales and marketing managers to pinpoint local problems, measure individual productivity and crack competitive efforts.

S.C. Johnson & Son, Inc. markets a wide range of furniture and floor-care products, special cleaners, car waxes, health and beauty aids, air fresheners and insecticides in grocery supermarkets and mass merchandising outlets throughout the country.

Previous Situation

Before Johnson turned to the optical mark reader, salesmen filled out call reports covering their activities each day. Unfortunately, the reports were not uniform, since each salesman emphasized different things. As a result, Johnson management was left with a lot of unanswered questions.

For example, these daily reports looked at a supermarket through the eyes of a salesman, not a customer. A store might not have any "Glo-Coat" on the shelf, but the salesman knew there were cases in the stockroom waiting to be unpacked.

So, according to the saleman, the store was fully stocked. To a customer, however, that store was out of "Glo-Coat." The customer would then buy another brand.

But salesmen's activity reports designed for the scanner look at the stores' shelves from the customers' standpoint, spotlighting items actually on the shelves or at a point-of-purchase display. Besides showing what's on hand, these reports also pinpoint the out-of-stocks.

Eye on the Competition

Along with looking at Johnson products, the new activity reports look at competitive distribution, competitive promotions and competitive pricing. The system gives Johnson management a weekly update on how its product line is doing vis-a-vis competition in the major retail outlets.

With these activity reports, Johnson management can sample 10,000 to 12,000 major outlets in a week's time. To do this in the conventional way — with an audit by an outside company — would cover only a small number of stores — 1,400 to 1,600 — and would take four to six weeks. In addition, it would be expensive.

Every salesman fills out an activity report for each store called on during that day. By simply filling in circles on the form, the salesman identifies the store, the distribution and pricing of Johnson and competitive product lines, and the condition on the shelf.

These reports are sent here,

(Continued on Page 56)

Drum Plotters Get Antistatic Film

WELLESLEY, Mass. — An antistatic, ripple-free drafting film for drum plotters has been introduced by Charleswater Products, Inc.

The film, made of 3.5 mil polyester, was designed to be independent of humidity conditions but produce sharp, distinct lines, a spokesman claimed.

The film is available in several sizes to fit all common plotters, including the California Computer Products, Inc. (Calcomp) 936 and 965 drum plotters. It sells for $80 for a roll 20 yards long by 36.7 in. wide.

Charleswater is at 3 Walnut Park, Wellesley, Mass. 02181.

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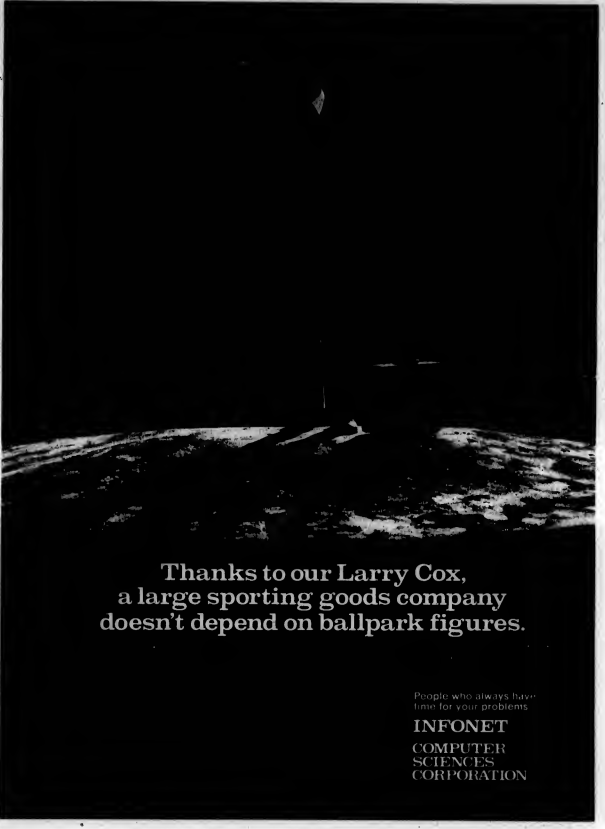

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Prime computers are also true multi-user systems: one computer can handle up to 64 simultaneous users in such diverse activities as RJE communications, forms processing, on-line data entry, computational time-sharing, and database management. And the PRIMOS Operating System allows any user to use any language at any time.

For more on how Prime helped ESCO and on how we can help you, write David R. Johnson, Marketing Manager, Prime Computer, 40 Walnut Street, Wellesley Hills, Massachusetts 02181.

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From Designer's Drawing

Graphics System Provides Bill of Materials

SUNNYVALE, Calif. — Calma Co., Inc., has introduced an interactive graphics system that can combine several steps in the engineering process and automatically produce a bill of materials from a designer's drawing, according to a spokesman.

The Computer-Aided Design for Engineers and Constructors (Cadec) system, built around a 16-bit Data General Corp. Eclipse 230 minicomputer, was designed for use by architectural, civil, electrical, process, mechanical and instrumentation engineers.

Core Size

The system comes with a minimum core size of 32K bytes (the maximum is 256K) and can accommodate up to four disks of 80M- or 320M bytes. In addition, there are standard interfaces for flatbed plotters and 9-track, 800- or 1,600 bit/in. tape drives, Calma said.

After a designer has produced a drawing at a CRT terminal, the Cadec system automatically counts the number of parts, lengths and other details in the drawing and processes this data for subsequent use by other personnel involved in the design process, the spokesman explained.

System Features

Features of the system include the abilities to produce a line by specifying its endpoints, to place graphic and text information precisely on a drawing and to give immediate feedback on an attached CRT, he claimed.

In addition, the system can display isometric and perspective views as well as top, front, side and auxiliary views.

Prices for a minimum configuration, which includes one disk drive, one plotter, one tape drive, one input station with an 11- by 11-in. tablet or digitizer and software, start at $200,000. Calma is located at 527 Lakeside Drive, Sunnyvale, Calif. 94086.

Information is digitized and entered into the Cadec graphics system, which incorporates a Data General Corp. Eclipse 230 minicomputer.

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Versatec Printer/Plotters Designed for Rugged Sites

SANTA CLARA, Calif. — A family of militarized printer/-plotters from Versatec, Inc., is said to deliver a 132-column printout and full graphics at speeds ranging from 500- to 1,000 line/min from computers or CRT terminals.

Each of the six models in the 7000 series uses a nonimpact electrostatic writing technique and features a self-aligning backplate electrode writing head, toner channel and paper cutting assembly, the firm said.

All printed circuit cards plug into a common printed circuit backplane. The power supply is mounted on one plug-in card.

An Ascii 96-character set is standard; a scientific/engineering 124-character and a typesetting 128-character set are optional. Font styles include standard Gothic and optional Roman, Courier and custom fonts.

The series was designed and tested to meet military specifications for temperature, shock, vibration and noise. They can be applied in such areas as strategic and logistics control, tactical command, telecommunications and mapping, a spokesman said.

In desktop or rack-mountable models, the units range in price from $18,000 for a printer only to $19,500 for a multifunction printer/-plotter. Versatec is at 2805 Bowers Ave., Santa Clara, Calif. 95051.

Optical Scanner Puts Glow On Sales of Wax Maker

(Continued from Page 53)

where they're collated by territory, then put through a National Computer Systems (NCS) Sentry optical mark reader. This reader can scan up to 3,600 reports an hour, extracting information and putting it on magnetic tape.

The tape is fed into a CPU that analyzes the data, then runs a printout or stores it in memory for subsequent processing.

It takes the Sentry scanner less than four hours to process the 15,000 activity reports received each week, according to a Johnson spokesman. Results are immediately available to top management; they go out to the field a day or so afterward.

Johnson officials point out that actually the Sentry scanner doesn't do anything an army of key entry operators couldn't do; the scanner simply does it far faster and at far less cost.

Working with the CPU, the Sentry scanner can sieve out facts that might be overlooked or be too expensive — in time and money — to uncover. It helps monitor distribution of new products, meshing merchandise flow with marketing effort.

And it helps the salesmen boost sales of existing products and accounts, Johnson said.

The scanner is also an excellent sales management tool, the spokesman noted. Printouts show each salesman's calls, sales, display setups and overall effectiveness, enabling management to flag potential problems and to give credit where credit is due.

HP Official Says
Desktop Computer, Mini Differ Widely

By Jeffry Beeler
CW Staff

PHILADELPHIA — Much confusion has arisen recently about the distinction between desktop computers and minis, but many basic differences separate the two classes of equipment, according to Fred Bode, marketing manager of Hewlett-Packard Co.'s Calculator Products Division.

Although both desktop computers and minis use basically the same technology, they take very different approaches to optimizing that technology, Bode explained during a seminar at a recent conference here. They also serve fundamentally different types of users, he noted, although their applications do not differ substantially.

Focusing primarily on scientific and technical applications, Bode said desktop computers are optimized to be "friendly" and easy to use, especially for individual users. Desktop computer buyers can easily link programs from cartridges, large disks or floppy disks, edit easily and quickly from their keyboards and execute individual programs in memory with the ability to interrupt and branch to service routines.

Minicomputers, by contrast, are optimized for flexibility, speed, power and multiprogramming, Bode said. Users of this equipment class can execute many programs concurrently in main memory and swap many others automatically from disks.

With the resulting increase in operating system complexity, users can maximize hardware and software performance if they have the expertise and inclination to do so, the marketing manager said.

Differences in Users

Because of the differences in how the two CPU classes optimize their technology, desktop computers primarily suit "professional noncomputer users," whereas minis mainly serve DP experts, Bode explained. In the former category, he included users like "scientists, engineers or business people who are experts in their professions [but who] do not necesarily want to become computer sophisticates."

In the latter category, he included users who "are experts at what they do but [who] in general have developed expertise in the use of computers as well." Such users demand flexible and expandable systems because they attack a much wider range of computing problems than users with little or no DP background, he said.

Bode partly attributed the frequent failure to understand the differences between desktop computers and minis to converging product trends. As desktop computers and minis have grown more alike in performance, cost and size, the line separating the two equipment classes has become increasingly blurred, he explained.

Bode also blamed the confusion on the origin of desktop computers. Most of the current leaders in that product market — Hewlett-Packard, Wang Laboratories, Inc. and Tektronix, Inc. — began as programmable calculator manufacturers.

As a result, "many people still regard [desktop computers] as calculators with considerably less power and capability than

(Continued on Page 58)

[illegible]	[illegible]	[illegible]
Keyboard Access	Immediate	Multiterminal Capability
Languages	Interpretive; Requires No Compiling	Multilanguage Capability; Requires Compiling
Packaging	Integrated Package	Usually Packaged As Stand-Alone System
Upward Compatibility	Can Accommodate Added Memory and Peripherals	Can Expand to Multiprocessor Network Using Same Software
Distributive Systems	Unable to Serve as CPU in Multiprocessor Networks	Can Control Distributed Network
Operating Systems	Program Editing Controlled By Firmware	Software Modules Developed by Executive Packages
Operating Personnel	Requires Little Training to Program And Operate	Requires Systems Manager With Specialized Training

Contrary to popular user opinion, many basic differences in product characteristics separate desktop computers and minis.

Take Vendor Claims With Salt, Microdata Executive Advises

By Jeffry Beeler
CW Staff

PHILADELPHIA — Consultants and other disinterested parties have long warned users to challenge minicomputer makers' glowing sales claims, but now the advice comes from one of the vendors — and in unusually hard-nosed language.

"Be an extremely tough negotiator when you're in the market for a system, and make sure you get your vendor's key guarantees in writing," Jack Bertch, Microdata Corp.'s vice-president, warned prospective minicomputer owners at a recent seminar.

Although the DP industry is slowly shedding its reputation for unreliability and inadequate service, "caveat emptor still applies to hardware acquisition, and it will never disappear completely," Bertch said.

Outlining some pointers first-time users should keep in mind when selecting a minicomputer system, Bertch stressed the importance of not underestimating installation costs. "Estimate the total amount you will have to pay for your new system, then double the figure because no matter how carefully you try to predict your expenses, unanticipated costs will invariably arise," he said.

In choosing a prospective hardware supplier, users should list every capability they expect from a reliable vendor and then rate the available candidates in each performance category, Bertch recommended. Some of the selection criteria most frequently mentioned by companies that have already installed minicomputer systems include operating system software, vendor reputation, system reliability, price and field maintenance.

After rating each of the potential suppliers, users should compare their findings with the evaluations of current minicomputer users, Bertch continued.

(Continued on Page 64)

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Plessey Ruggedizes Unit

PHILADELPHIA — Plessey Peripheral Systems, Inc. introduced a "ruggedized" version of its PM-1150/5 computer system at the recent Mini/Micro '78 conference.

Built around a Digital Equipment Corp. PDP-11/34, the PM-1150/5RP provides memory management, hardware multiply and divide, parity memory expandable from 32K bytes to 248K bytes, multilevel priority interrupts, power fail/auto restart and a bootstrap read-only memory loader with Ascii console emulator, according to Plessey. The processor is also hardware and software compatible with a range of DEC and Plessey products, it added.

A minimum PM-1150/5RP configuration consists of a 10.5-in. high chassis, power supply and fans, PDP-11/34 processor cards and DEC DD11-PK processor backplane, bootstrap loader, parity controller, 32K-byte core or semiconductor memory and operator console, officials said.

Users can also specify optional configurations that incorporate a choice of five interfaces, a 5M- or 10M-byte disk drive unit, VT52 Decscope- or LA36 Decwriter-type terminals and other peripherals, Plessey officials noted.

A basic PM-1150/5RP configuration with 32K bytes costs $20,000 from Plessey at 17466 Daimler Ave., Irvine, Calif. 92714.

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HP Unveils Expanded Disk Drive

PALO ALTO, Calif. — A successor to the Hewlett-Packard Co. 15M-byte 7905A disk drive system stores one-third more formatted data than its predecessor, but is plug-compatible with the earlier model, HP said.

The 20M-byte 7906 disk system is software-compatible with HP 1000 systems and with 21MX-based configurations, company officials added.

Power circuit modifications have added design redundancy to critical circuits within the power board, and a prefilter with no fans or other mechanical parts provides an additional level of air filtration with the drive, the firm explained.

Measuring 15-3/4 in. high, the rack-mountable system uses the same type of removable cartridge as the 7905A and accesses data with a 25 msec average seek, 8.33 msec average latency and 7.5 bit/sec transfer, an HP spokesman said.

Because each HP 13037B disk controller accommodates as many as eight drives, users can expand systems to almost 157.3 million bytes as formatted disk storage on as many as eight 7906 drives, without adding another controller, the spokesman added.

Doubled Capacity

To boost the 7906's storage capacity compared with the 7905A's, HP doubled the recording capacity of the latest drive's fixed platter so that it now holds half the product's total capacity, the firm explained.

The drive uses servo track-following positioning, with one surface of the platter dedicated to servo information. But instead of placing a data track directly under each servo track, HP offset the data tracks .033 micro-in. to either side of the servo tracks, HP said.

This design technique allows the 7906's recording surface to hold 80 tracks, with a density of 384 track/in. and a maximum density of 4,680 bit/in., the spokesman explained.

The 7906M master drive with controller and cabinet costs $14,000, while slave drives cost $10,500. Rack-mounted versions of the master and slave drives cost $13,000 and $9,500.

HP is at 1501 Page Mill Road, Palo Alto, Claif. 94304.

Desktop Computers, Minis Vary Widely: HP Official

(Continued from Page 57)

minicomputers."

Elsewhere in his address, Bode further contrasted desktop computers and minis by noting how they differ in the following product characteristics:

- Keyboard access. Desktop computers provide immediate or "live" keyboard access that allows users to perform many operations while running programs.

Minicomputers, on the other hand, provide a multiterminal capability that allows concurrent program development and multistation operation in conversational or batch mode, Bode said.

- Languages. Most desktop computers use an interpretative language like Basic and APL, which users can run without compilation. Language selection depends on the firmware users specify when they buy their systems.

Minicomputers, by contrast, usually use Fortran, Cobol and other languages that require compiling. The language that mini users select is determined by the software they obtain for their systems, Bode explained.

- Packaging. Desktop computers usually come in an integrated package incorporating all the peripherals that constitute a typical system, whereas minis are often configured as stand-alone units without peripherals, the HP executive noted.

- Upward compatibility. With desktop computers, this usually means "transportability of data and programs to larger machines via either data communications or some storage media like tapes, floppies and hard disks." Bode said.

With minicomputers, the concept means users applying the same set of software, can grow from a processor with a small memory base to a very large multiprocessor, multidisk system.

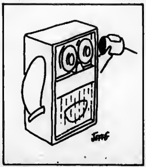
- Distributive systems. Although most desktop computers are compatible with and can report the results of their local processing to larger CPUs, they cannot serve as central processors in multiprocessor networks, Bode pointed out.

Late model minicomputers, however, usually come with operating systems that allow the machines to control distributed processing networks.

- Operating systems. Desktop computers usually provide firmware-controlled editing capabilities that facilitate program development.

With most minis, on the other hand, users develop their software with the help of "very powerful" operating systems, Bode said. These executive packages permit the configuration of software modules like file managers, editors and device drivers.

- Operating personnel. Besides requiring little formal training to operate and program, desktop computers permit easy access and can be easily modified to suit custom applications. With minis, by contrast, users require DP managers with specialized training to configure hardware/software systems and to coordinate the activities of their computer operators, Bode said.



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Controller Lets DG Users Access 1.2G Disk Bytes

SUNNYVALE, Calif. — Users of Data General Corp.'s Eclipse and Nova minicomputers can reportedly access up to 1.2G bytes of on-line storage with a CPU-resident disk controller introduced here recently by Microcomputer Systems Corp.

The Model MSC-1300 accepts as many as four disk drives; by selecting the appropriate strap position on the controller board, users can accommodate 40M-, 80M-, 100M-, 200M- or 300M-byte removable media drives, according to a spokesman.

Equipped with firmware for Winchester-type fixed media drives, the single-board unit provides burst error detection and correction, overlap seek and built-in microdiagnostics, the spokesman said.

With the bipolar microprocessor-based controller, tasks like command chaining, data chaining and sector interleaving and key word searching can reportedly be offloaded from a CPU.

The disk controller costs $2,950 in OEM quantities from the firm at 440 Oakmead Parkway, Sunnyvale, Calif. 94086.

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Accept Varying Forms Widths

DG Adds Bidirectional Printers

WESTBORO, Mass. — The ability to accept multiple forms widths as well as to vary both the horizontal pitch and vertical line density of their output reportedly highlights two bidirectional matrix printers introduced here recently by Data General Corp.

Both the models 6073 and 6074 Dasher LP2 accept six-part forms 4- to 15 in. wide and up to 16.5 in. (99 lines) long, the company said.

They also provide a selectable horizontal pitch of either 5- or 10 char./in. and generate compressed, normal width, elongated or elongated compressed characters of either 6- or 8 line/in., a spokesman added.

The Model 6074 also produces condensed horizontal pitches of 8.25- and 16.5 char./in., DG said. As a result, the 6074 is said to print up to 132 characters on an 8.5-in-wide form.

Both models provide 132-column output at 10 char./in. and generate 180 char./sec, DG said. That printing speed translates to 80 line/min for 132-character lines and 300 line/min for 2-character lines.

A 16-bit Micronova microprocessor with a 1,000-word random-access memory buffer reportedly allows the 6073's and 6074's print head to jump directly to the next character when it finishes printing a line of text. This logic seeking capability avoids lengthy carriage return delays and maximizes print time, the firm claimed.

Operating from 115 or 240 Vac, the 60-lb units use a 7 by 9 dot matrix to form 96 Ascii upper/lower case characters with true descenders, underscoring and punctuation marks, the spokesman said. Both printers also come with international fonts for France, Germany, Sweden and the UK.

An 8-bit parallel interface permits the receive-only printers to connect to any member of the Eclipse or Nova family, according to the spokesman.

DG estimated the operating life of the products' cartridge ribbon at more than five million characters.

The models 6073 and 6074 cost $3,250 and $3,350, respectively. A Model 6086 printer subsystem with a 6073, programmed I/O controller and wire paper basket costs $3,950. With a 6074, that configuration sells for $4,050.

A Model 6088 printer subsystem with a 6073, data channel controller and paper basket costs $4,650, compared with $4,800 for a 6074-based configuration. DG is at Rt. 9, Westboro, Mass. 01581.

Drives From Shugart Turn Floppy Systems to Fixed

SUNNYVALE, Calif. — Systems designers can reportedly upgrade their small business configurations, intelligent terminals and word-processing equipment from floppy disk units to fixed-disk units with two drives announced here recently by Shugart Associates.

Described as the firm's first rigid disk drive products, the models SA4004 and SA4008 store 14.5M bytes and 29M bytes of unformatted data, respectively, with an optional 144K bytes of additional head-per-track storage, a Shugart official said.

Although compatible with the IBM System/32, System/34 and Series/1, both OEM models weigh 35 lbs and occupy 5.25 in. of a 19-in. Retma rack, the spokesman noted.

Both units are also said to use Winchester read/write head and media technology, transfer data at 889 kbyte/sec, seek in an average of 87 msec, operate with 10.1 average latency and provide 256 byte/-sector with 60 sector/track.

The Model SA4004 provides one fixed disk and 808 addressable tracks; the Model SA4008, two fixed disks and 1,616 addressable tracks, the spokesman said.

Both drive units require +24 Vdc at 2.5A and +5 Vdc at 2.5A, and they use the same interface as Shugart's SA800 and SA850, he added. The band actuator used by the two models reportedly incorporates the same design as the firm's SA850 double-sided floppy disk drive unit.

The 14.5M-byte drive sells for $2,550; in quantities of 250, it costs $1,325. The 29M-byte unit sells for $3,500 or $1,800 in 250-unit quantities.

The head-per-track option, meanwhile, costs $350. Delivery leadtimes for the products are 120 days from Shugart at 415 Oakmead Parkway, Sunnyvale, Calif. 94086.

Printcraft Units House Cartridges

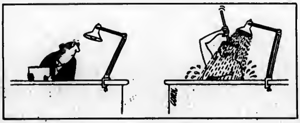
NEW YORK — Two modular desk top storage cabinets for 1/4-in. data cartridges have been introduced by Printcraft Systems, Inc.

The first was designed to house the 300-tape cartridge used with 3M, IBM 5100, Pertec Computer Corp., Tektronix and NCR Corp. drives.

The second houses the smaller 150-ft cartridge used with Hewlett-Packard Co. and Texas Instruments, Inc. equipment.

Each cabinet stores 24 cartridges, each in its own track.

The large cartridge cabinet is designated Catalog No. DCL-24 and costs $40. The smaller cartridge, No. DCS-24, costs $30. Printcraft is at 11-17 Beach St., New York, N.Y. 10013.



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Energy Use Programs Updated

ATLANTA — Installations using an IBM Series/1 to monitor and regulate utility bills can reportedly cut systems and programming costs with enhancements IBM has recently added to its Facility Control/Power Management programs.

Designed for users with multiple facilities and demand meters, the enhancements include a program named FC/PM-4 and two program subsets named FC/PM-2M and FC/PM-4M.

The FC/PM-4 can cut electrical consumption and costs for single facilities with multiple demand meters and for local and remote facilities with single meters, IBM claimed.

One Series/1 with an FC/PM-4 program, for example, can control a facility such as a shopping center with as many as eight demand meters, the company said.

Energy for the meters can come from the same or different sources such as gas, electricity or steam.

The program can also control up to eight local or remote buildings, each with a single meter, IBM officials explained.

User Tailoring

Although the FC/PM-4 requires no user programming, users can tailor the program to meet individual requirements simply by using a fill-in-the-blanks form to answer a series of questions about the devices to be controlled, the initial targets, control periods and alarm condition indicator points, a spokesman said. Users enter information from the form into the Series/1 through an operator workstation.

By entering English language commands at the workstations, operators can also use the program to help add devices to a computer system or change the configuration's operating strategy, the spokesman said.

Application Program Preparation Utilities (Appu) that accompany the FC/PM-4 allow users to modify the program, which controls as many as 128 monitor points and 158 device control circuits, the officials added.

The FC/PM-4M program subset, meanwhile, functions similarly to the FC/PM-4 but was designed for remotely located users who need no program modifications, IBM explained.

Users can install the FC/PM-4 at a central computing site and the FC/PM-4M, which provides no Appu, at remote sites, the company recommended.

With the FC/PM-2M, users with one electric meter can monitor up to 95 alarm or condition indicators and control an equal number of device circuits, IBM said.

Users with multiple facilities can operate IBM's previously announced FC/PM-2 at a central site and the FC/PM-2M at remote sites.

FC/PM-4 will become available for shipment Nov. 24 for a monthly license charge of $225. Shipments of the FC/PM-4M will also begin Nov. 24 for a monthly fee of $100.

The FC/PM-2M will become available for delivery on May 12 and costs $80/mo.

Lockheed Revamps Line

PHILADELPHIA — Lockheed Electronics Co. has scrapped one of the two models that constituted its System III business computer line, slightly modified the remaining unit and reintroduced it as a "single-model" System III.

Since early 1977, the company's business computer family had consisted of two units — the Model A and the larger Model B. At the recent Mini/Micro '78 exposition here, however, the firm announced it had eliminated the Model A and repackaged the Model B with an expandable chassis that reportedly allows users to upgrade their systems by adding or repositioning circuit boards.

A System III chassis holding a CPU, main memory, peripheral controllers and power supply costs $29,950 and is available from Lockheed at Plainfield, N.J. 07061.

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Library Net Puts Minis at Front and Back Ends

COLUMBUS, Ohio — More than 1,300 libraries in 46 states have cut the cost of cataloging materials and speeded the placement of new books on their shelves by subscribing to a minicomputer-based communications network operated here by OCLC, Inc.

Each week, from about 2,000 remote on-line terminals, libraries of all types — college, public, specialized and school — catalog more than 200,000 book titles in OCLC's data base, which holds some 3.6 million records of materials like books, maps, music scores, sound recordings, manuscripts, audiovisual materials, magazines and journals.

Using the contents of this data base the hierarchical network produces machine-readable cataloging tapes and computer-generated accession lists. It also custom-prints about 1.7 million catalog cards each week for the nonprofit organization's customers, according to Don Keates, manager of OCLC's system department.

Front and Back Minis

For front-end supervision, the nationwide network uses four TC-16 Nonstop minicomputers from Tandem Computers, Inc. Together, these front-end processors control incoming communications from more than 65 leased multidrop lines, Keates said.

Back-end data transfer, meanwhile between OCLC's 12G-byte data base and four Xerox Corp. Sigma 9 applications processors depends on 10 Tandem TC-16 minis, Keates added.

All 14 front-end and back-end processors in the OCLC network incorporate 484K-byte main memories, address up to 256 peripherals and access a 6G-byte Tandem disk drive system installed to duplicate the data base and thus ensure system integrity.

Each processor also uses Guardian, Tandem's virtual operating system that reportedly permits parallel processing in separate CPUs and multiprogramming in one CPU.

"Tandem was a logical choice for us," Keates said in explaining why OCLC picked its current configuration instead of rival systems. "Tandem offers the only commercially available uninterruptible computer system. Its systems can be configured with up to 16 interlinked multiprocessors, and the company supplies a data base record manager that gives us access to files and duplicates the data base."

Prospective Applications

When OCLC completes a planned expansion of its existing configuration, the firm will be able to automate several library activities in addition to the ones already on-line. Some of these prospective applications will include interlibrary loan management, materials acquisition, subject searches, remote catalog access and circulation control.

Plans are also under way to increase the front-end supervisor network to eight Tandem computers and to convert the network's CCITT X.25 standard packet protocol to communicate with other library systems throughout the country, Keates said.

To ensure continued data access during systems failure, OCLC has provided each of its peripherals with two paths to the communications network. If one of the paths fails, the configuration automatically activates the backup path, Keates explained.

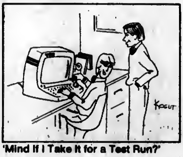
Interprocessor and data transfers are controlled independently in the OCLC network. A dual communications bus transfers data between processors at 13M byte/sec, while a block multiplexer channel, one for each CPU, oversees 4M byte/sec data transfers.

Because of the redundant access paths, OCLC operators can remove, replace or add any peripheral without interrupting network operations, the systems department manager explained.

To further ensure data base integrity, the network uses Tandem's Enscribe data base record manager as part of the Guardian operating system, Keates added. Enscribe reportedly provides a data definition language and a cache buffering scheme that reserves part of the network's main memory as a cache buffer.

With the network's software, applications programmers can write communications programs without knowing which processor will eventually run them. Programmers can also communicate with I/O devices or with other programs without knowing the physical addresses of the devices connected to the network.

As a result, the Tandem software simplifies the usually complex task of writing multiprogramming and multiprocessing application software, Keates noted.



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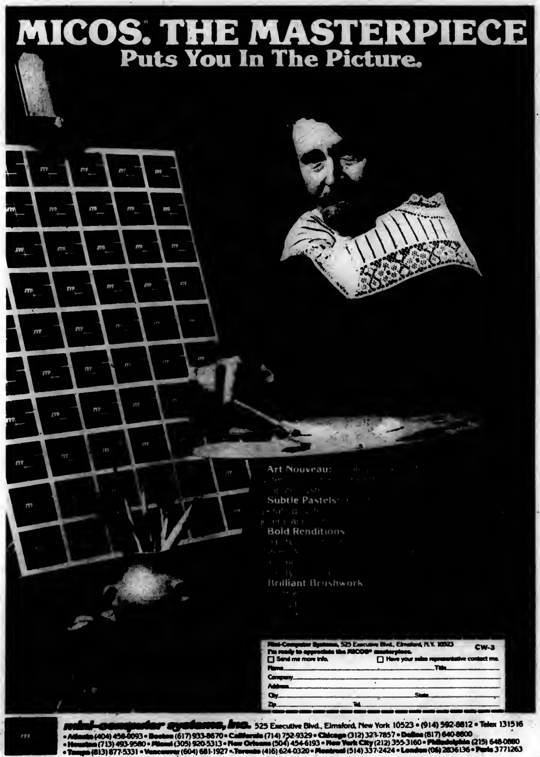

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HI Graphics Plotter Now Fits Minis

PHILADELPHIA — Although designed originally as a module for microprocessor- and microcomputer-based systems, a graphics plotter introduced at the recent Mini/Micro '78 exposition here can also be incorporated into minicomputer configurations, according to a spokeswoman for Houston Instruments, the plotter's manufacturer.

Microplotter 2 moves 2.4 in./sec to produce drawings as large as 8.5- by 11 in. for applications in education, laboratory research, medicine, navigation and mechanical or electrical engineering, the spokeswoman said.

Equipped with an RS-232C or 8-bit parallel interface, the unit performs 240 step/sec at 2,400 bit/sec and 480 step/sec at 4,800 bit/sec, she added. Users can reportedly select a .005- or .01-in. step size by moving a jumper on the product's internal circuit board.

The plotter also accepts lower case Ascii digits to define incremental moves in the standard eight-vector format, the company explained.

Microplotter 2's controls are said to include a power switch, X-axis manual locator and Y-axis locator.

The plotter costs $1,085 from HI at One Houston Sq., Austin, Texas 78753.

Grain of Salt Recommended For Claims From Vendors

(Continued from Page 57)

Consultants can also prove an "invaluable" aid to first-time users, not just in selecting the right hardware vendor, but also in defining the users' needs and generating systems specifications, Bertch said. He advised prospective buyers to rely heavily on their consultants. "Drive your consultant nuts," he urged. "In most cases, it won't be such a long drive."

After a lengthy and thorough vendor evaluation has narrowed the field of potential hardware suppliers to a few candidates, first timers should visit local minicomputer users in their respective industries, Bertch recommended. "But," he added, "you should not limit yourself to the installations chosen by the vendors because they will show you only their most successful accounts."

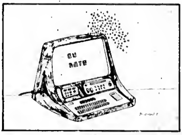
Rather, users should choose for themselves what sites they wish to visit, either by calling companies listed in the yellow pages of their local phone directories or by contacting International Data Corp. (IDC) in Waltham, Mass. "For a small fee, IDC can make available to you its prepared lists of computer users in every major city in the country," Bertch told his listeners.

If the final stage of vendor selection ends in indecision about two differently priced systems — all other factors being equal — users should pick the more expensive configuration, provided the difference in cost does not exceed 15%, he asserted.

Before making the final vendor selection, users should also prepare detailed plans for emergency computer backup, determine how often the hardware suppliers will perform preventive maintenance and how much it will cost, uncover any hidden expenses and find out if the vendors' software would be transportable during subsequent systems upgrades, Bertch advised.

"Very often, users acquire software only to discover later they can't continue to use the package when they expand their configurations," he explained.

After choosing a hardware supplier and specifying a system, first-time users should hire an attorney to review the contract and make sure it does not unduly favor the vendor. "In 90% of the cases, the contract does favor the vendor," the Microdata executive warned.



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Vector Graphic Unveils Video Display Board

WESTLAKE VILLAGE, Calif. — Vector Graphic, Inc. has introduced an S-100-bus-compatible video display board capable of generating up to 1,024 characters.

The Flashwriter uses a 7 by 9 dot matrix to produce images and incorporates an eight-bit parallel port with latched strobe that may be used as a keyboard port. The board can produce character-by-character, reversed video, reduced intensity, block and line graphs and also has its own screen-refresh memory, the firm said.

The unit requires 8 Vdc at 1.2A and the board's video output is available as composite video or separate video and sync, the firm noted.

The video board costs $195 as a kit and $235 assembled from the company at 790 Hampshire Road, Westlake Village, Calif. 91361.

Keyboard Goes With Video Boards

TEMPE, Ariz. — Microage has announced a keyboard designed for use with 64- and 80-character display boards.

The MKB-2 features a numeric key pad, upper and lower case controls, cursor control keys, two-key rollover and automatic repeat on all keys, a spokesman stated. The unit also includes a parallel interface, strobe or pulse, on-board regulation and standard DB25S connector.

The keyboard, housed in a steel case, costs $149 from Microage at No. 101, 1425 W. 12th Place, Tempe, Ariz. 85281.

Microage Has Shopper's Guide

TEMPE, Ariz. — A 72-page guide to personal computing, available from Microage, includes tips on system selection and design as well as manufacturers' specifications on selected microcomputer hardware.

The *Byte Shopper* includes an introductory description of personal computing and illustrations of microprocessor functions and applications, a spokesman stated. More than 120 manufacturers are represented and an eight-page price list is included for prospective buyers.

Decision-oriented charts and graphs as well as a glossary of data processing "buzzwords" are also included. Graphic visualizations of microcomputers and their function are provided to help clarify system applications, the firm noted.

The book sells for $3.95 from the company at No. 101, 1425 W. 12th Place, Tempe, Ariz. 85281.

For 8080, Z80, 8085

Microsoft Adds Cobol-80

ALBUQUERQUE, N.M. — Cobol-80, a language developed by Microsoft for users of 8080-, Z80- and 8085-based microprocessor systems conforms to the 1974 Ansi specifications and is said to give users access to computer programs already written in Cobol.

The language provides routines for sequential, relative and indexed file handling as well as library and interprogram communications, the firm said. Other features include the verbs STRING, UNSTRING, COMPUTE, SEARCH and PERFORM along with condition specification by way of condition-names, compound and abbreviated conditions. The programming also allows a packed decimal data representation to conserve memory on the floppy disk, the firm pointed out.

The Cobol-80 system consists of two packages: a compiler for translating source code into relocatable object code and a runtime system containing standard routines needed by the object code at execution time, a spokesman explained.

The system operates in less than 32K bytes with a 250 line/min rate of compilation, the firm added.

Cobol-80 is available to run under the CP/M and Isis-II operating systems for $750 including documentation. The documentation is also available separately for $20 from Microsoft at Suite 819, 300 San Mateo, N.E., Albuquerque, N.M. 87108.

Analyzer With Clip-On Probe Diagnoses 8080-Based Systems

YORKTOWN HEIGHTS, N.Y. — An 8080 microprocessor system analyzer incorporating a clip-on probe that connects directly to a chip under test was unveiled by AQ Systems, Inc.

The AQ8080 is reportedly designed to function without memory allocation, address or I/O port assignment, a special clock or a separate terminal. Built-in controls and displays permit the user to examine or modify all memory locations, I/O ports and internal microprocessor registers, including the program counter and the stack pointer, according to a spokesman.

Debugging capabilities are provided by conditional breakpoint; data breakpoint and monitor functions that can be qualified to respond to memory reference, stack reference, I/O locations and read or write activity, the firm noted.

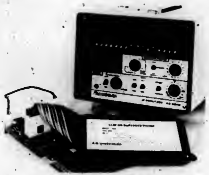
Programs may be single stepped by a machine cycle or an instruction step or run at an adjustable speed of from one step/sec to 4,000 step/sec while examining memory or registers, the spokesman pointed out. Up to 128 instructions can be stored in the system.

Analyzer Function

The analyzer will examine or modify the contents of system memory and the microprocessor's program counter, stack pointer or any other single register or register pair, the firm said. The microprocessor address bus is monitored during program execution, and the AQ8080 can halt execution upon the occurrence of a specified address or breakpoint.

LED displays are provided for analyzer and microprocessor system status, microprocessor cycle status and binary data, while two hexadecimal displays are included for data, address and switch registers, the firm added.

The AQ8080 costs $2,250 from AQ Systems, Inc., 1736 Front St., Yorktown Heights, N.Y. 10598.



System analyzer from AQ Systems, Inc. connects to 8080-based microprocessors via a buffered 40-pin clip-on probe.

Cosmac 1802 Users Get S-100 Interface Aid

MELBOURNE, Fla. — Infinite, Inc. is offering information to users of RCA Corp.'s Cosmac 1802 microcomputer on interfacing the unit to the S-100 bus.

The engineering package containing schematics as well as signal and component descriptions is available for $9.95 from the company at 1924 Waverly Place, Melbourne, Fla. 32901.

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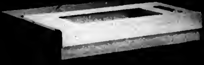

8080 Users Gain Expander

CANTON, Mass. — A 32-channel analog-to-digital (A/D) expander board introduced by Datel Systems, Inc. works in conjunction with the firm's master converter board and is compatible with Intel Corp.'s MDS-800 as well as National Semiconductor Corp.'s BLV-80 microcomputers, according to a spokesman.

The ST-800ADX32S board acts as a slave to the converter board and is electrically compatible with the backplane pinouts of the host microcomputer. The two boards digitize analog inputs to a 12-bit binary resolution with an accuracy of .025%, the spokesman claimed.

The system accepts 64 single-ended A/D channels with input ranges of +5V, +10V, -5V or -10V, he added.

System multiplexers have a 1 microsec settling time and channel-to-channel throughput is rated at 20 microsec, Datel said.

The unit includes printed circuit board pads and current-limiting resistors or fuses, the firm said. Board options include direct memory access (DMA) operation capabilities offering a total data transfer rate of 38,000 sample/sec and an on-board addressing function that can expand up to 256 A/D channels.

Ribbon cables carrying analog signals from the master board are also available as options.

The expander board costs $395 from the firm at 1020 Turnpike St., Canton, Mass. 02021.

For Prototypes

Zilog Backs Development

CUPERTINO, Calif — Zilog, Inc. has unveiled a stand-alone development system for prototype development of Z80-based microprocessor systems with clock rates not exceeding 2.5 MHz.

The ZDS-1/25 provides the user with a single-chassis microcomputer with dual floppy disk drives for up to 60K bytes of random-access memory (RAM) storage as well as optional peripherals and interfaces, according to a spokesman.

Programmable Module Feature

System features include a 3K programmable read-only memory (Prom) monitor; a programmable hardware breakpoint module to enable suspension of instruction execution at given address or activity; a programmable real-time storage module for storing CPU or I/O port activity or monitoring memory functions; and a relocatable I/O operating system that provides a text editing, assembler, linker and file management system, the firm noted.

Memory Mapping

In-circuit emulation via a 3-ft cable connection and memory mapping in blocks of 256 bytes are also standard with the system, the spokesman added.

The ZDS-1/25 is available in three models: the 1/25A, a single-chassis system with 48K bytes of dynamic memory that costs $7,740; the 1/25B with 60K bytes of memory, priced at $8,340; and the $9,340 1/25C, a 60K-byte system designed to work with 4 MHz microcomputers that includes Zilog's PLZ programming language.

Specifications and applications information can be obtained from Zilog at 10340 Bubb Road, Cupertino, Calif. 95014.

Cross-Assemblers Offered

ATLANTA — Automated Logic Corp. is offering five microprocessor cross-assemblers for use on Digital Equipment Corp.'s PDP-11 minicomputers and LSI-11 microcomputers.

The Microseries runs in 12K words of memory and enables programs to be developed using the PDP-11 with the RT-11 operating system, the firm stated.

A companion program allows the output from the cross-assembler to be transferred directly to burn in the programmable read-only memories (Proms).

Floppy Disk Distribution

The Microseries cross assemblers are distributed on floppy disks and cost $250 from the company at Suite 115, 2675 Cumberland Parkway, Atlanta, Ga. 30339.

System Tests Floppy Disks

SANTA ANA, Calif — Applied Data Communications, Inc. has introduced a programmable floppy disk test system that it said can operate with either single-density or double-density as well as single-sided and double-sided floppy disks.

The 70T-300 system includes routines for read/write maintenance, error testing, variable step rate and window margining for bit shift, a spokesman stated. Each program can perform multiple test sequencing and repeats, he added.

The system's diagnostics are presented in a "ready-to-use" format that can be varied according to user needs, the firm said. Documentation includes step-by-step procedures for writing additional routines if required.

The test program is prerecorded on floppy disk and automatically loaded when the system is powered on.

Tester hardware and software diagnostics are fully documented with supplied operating manuals, the firm said. Technical support and programming assistance are provided through the factory.

The unit is available in two models: the 70T-300-2 for testing up to two drives and the 70T-300-4 for testing up to four drives. The systems, including power cords and industry standard interface cables, are priced at $6,450 and $7,200 respectively.

Applied Data Communications is located at 1509 E. McFadden Ave., Santa Ana, Calif. 92705.

T

TIME-SHARING — 1. A computing technique by which more than one terminal device can use the input, processing and output facilities of a central computer simultaneously. 2. A specific method of operation in which a computer facility is shared by several users for different purposes at (apparently) the same time. Although the computer actually services each user in sequence, the high speed of the computer makes it appear that the users are all handled simultaneously.

TTL — Transistor-transistor logic, a kind of bipolar circuit logic which takes its name from the way the basic transistor components are interconnected.

TTY — Teletypewriter equipment.

TURNKEY SYSTEM — Refers to an agreement whereby a supplier will install a computer system so he has total responsibility for building, installing and testing the system, including hardware and software.

U

UART (UNIVERSAL ASYNCHRONOUS RECEIVER TRANSMITTER) —Refers to a specific device that will interface a word parallel controller or data terminal to a bit serial communications network.

V

VERIFY — 1. To check, usually with an automatic machine, one recording of data against another in order to minimize the number of human errors in the data transcription. 2. To make certain the information being prepared for a computer is correct. 3. To determine whether a transcription of data or other operation has been accomplished accurately. 4. To check the results of keypunching.

VIRTUAL MEMORY — Virtual memory, ideally invisible to the user, involves the transfer of information one page or more at a time between primary and secondary memory and adds only that time required to page swapping to the normal operating time. This procedure leaves the programmer free to address total storage without concern as to whether primary or secondary storage is actually being addressed and effectively includes the large, inexpensive capacity of secondary storage in the system.

VTAM (VORTEX TELECOMMUNICATIONS METHOD) — A special data communications software package from IBM that organizes and simplifies data communications programming to serve remote workstations for a host computer.

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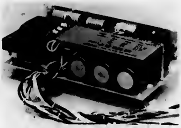
COMPUTERWORLD

National Semi Power Unit Tracks Line Load at .1%



National Semiconductor Corp.'s multilevel power supply fits Series/80 microprocessor boards.

SANTA CLARA, Calif. — National Semiconductor Corp. has designed a multilevel power supply for its Series/80 microprocessor boards that it said combines line and load regulation with current limiting, overvoltage protection and power failure detection.

The BLC 635 has circuits that limit current at 1.2 times the rated values at all levels as well as overvoltage circuits that trip at 1.16 to 1.32 times rated voltage, the firm noted. Load regulation is .1% for a 50% load change and line regulation is .1% for a 10% line variation.

AC Power Detection Circuit.

An ac power detection circuit in the unit supplies a TTL-compatible high-level signal when line voltage drops 10% below normal, the firm said. The signal returns low when line voltages reach 8% of the normal value.

All dc levels remain within specification for 2 msec after low line conditions and 7.5 msec after complete power loss for orderly shutdowns, a spokesman added.

The BLC 635 with cables for the Series/80 is priced at $460 from National Semiconductor at 2900 Semiconductor Drive, Santa Clara, Calif. 95051.

DEC, Heath Users Get Prototyping Board

SYLMAR, Calif. — A prototyping circuit board from Vector Electronic Co., inc. is said to permit construction of custom interface circuits for Heath Co. H11 microcomputers and Digital Equipment Corp. LSI-11s, PDP-8s and PDP-11s.

The Model 4607 plug-in board has etched contacts spaced to fit the dual 36-pin connectors used by DEC and Heath, according to a spokesman. To allow unrestricted component placement, the board is bare with an array of .042-in. diameter holes on .1-in. centers.

Dual in-line package (DiP) sockets or discrete components can be placed anywhere on the board, the spokesman claimed.

The board is fabricated of an epoxy-glass composite material with 2 oz. copper cladding, the firm noted. Pin terminations and edge strips are hot-solder-plater while card-edge contacts are gold-flashed nickel plate.

Mounting Holes

Card extractor mounting holes are located to match the outline of standard DEC modules, the firm added.

The board is priced at $15.95 with discounts available for quantity orders. Vector is at 12460 Gladstone Ave., Sylmar, Calif. 91342.

Cramer Arranges Seminar Series

NEWTON, Mass. — Cramer Electronics, inc. will present a series of microcomputer seminars here beginning June 7. The seminars are to assist technical people, engineers and designers and to provide updates on recent developments that can benefit their applications, Cramer said.

Topics Included

The seminars will cover various microprocessor systems and their related specifications, according to a spokesman. Topics will include the Motorola Semiconductor Products, Inc. M6800 system and peripherals on June 7; the RCA Corp. Cosmac series and related circuits on June 15; and the Advanced Micro Devices (AMD) 2900 bipolar system on Aug. 9.

The courses are offered in conjunction with the related manufacturers and are free on a limited attendance basis, the spokesman explained.

Reservations and information can be obtained from Cramer Electronics at 85 Wells Ave., Newton, Mass. 02159.

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NCC. Computerworld's got it covered—as only a newsweekly can.

This year's National Computer Conference promises to be the biggest ever. More than 40,000 people are expected to visit the record-breaking 1400 booths in the main show; and thousands more will be attending the newly-expanded *Personal Computing Festival* — including exhibits, speakers, and technical sessions on this fast-growing area of the computer world. And, of course, *Computerworld* will also be at NCC — to hail it, unveil it, and wrap it up — in three informative, important issues full of NCC news.

May 29th—Preview Issue: A complete rundown of the companies, products and services, keynote speakers and technical sessions you'll see at NCC. Plus — a guide of things to see and places to go in the Anaheim area. This issue will help you make the most of your time at NCC. (If you forget to bring your copy of *Computerworld* you can pick one up free at our booth — while they last.)

June 5th—Show Issue: Our Show Issue will include all the late breaking stories, program changes, intended product announcements and behind-the-scenes show details leading up to NCC. (It will also be available at our NCC booth.)

June 12th—Wrap-up Issue: Cohesive analysis and summary of the significant events of the '78 NCC. This issue will give details on product announcements and will review the content of program sessions, experts' observations and keynote speeches. The important events of NCC will be summarized here.

If you're a manufacturer or marketer in the computer field, don't miss these ad closing dates for *Computerworld's* NCC issues:

Preview Issue: (May 29th)—Color and Insert close: May 12; black & white close: May 19.

Show Issue: (June 5th)—Color close: May 19; black & white close: May 26.

Wrap-Up Issue (June 12th)—Color close: May 26; b&w close: June 2.

For all the details contact your *Computerworld* salesman. He can give you special assistance in NCC ad planning. Or call Terry Williams at (617) 965-5800 to reserve space for your ads.

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Despite Its Late Start

China Called Coming Technology Rival

By Marcia Blumenthal
CW Staff

HONG KONG — The People's Republic of China did not develop a computer until 1958 and even today commercial applications are rare, but China could rival the world's most advanced computer technologies by the end of the century, according to an analysis made by *Asian Computer-Yearbook*.

The Institute of Computer Technology, established in 1956 under the Chinese Academy of Science in Peking, played a leading role in developing computer technology, basing its first computer on Soviet Ural-1 designs.

Over the years, several computer-related institutes have been founded, each following the official government credo of developing computer technology to improve the quality of life, the analysis said.

Since the 1958 debut of China's first computer, scientists there have developed large-scale integration circuits with a capacity of 10,000 transistor elements, compared with U.S. and Japanese designs of 12,000 elements.

Presently Chinese computers use only magnetic tape drives, but the institutes are interested in developing disk drives, the analysis pointed out.

For the most part, computer applications are geared to scientific uses such as space exploration, nuclear physics and telecommunications.

Although the development of computers has been at the institute and university levels, scientists regularly spend one or more days building computers alongside factory workers, thereby helping to eliminate the distinction between manual and mental work, the analysis noted.

These factories are often small, collectively owned enterprises in urban areas. One of the more well known is the Shanghai Door Handle St. Factory, which employs about 450 workers, 80% of them women. The factory's unusual name comes from the products it produced before switching to the manufacturers of computers.

A major problem China faces in computerization is the translation of Chinese characters, usually representing more than one word, into computer language, according to the study,. There are more than 4,000 basic characters essential for day-to-day communication.

But help is on the way. Dr. An Wang, president of Wang Laboratories, Inc. has developed a system that identifies characters based on the shapes of their corners.

This coding system reduces any Chinese character to a six-digit, three-corner code, the analysis explained.

Eager to Learn

Although China has proven its ability to build large-scale computers, it is still eager to learn from more technically advanced countries.

According to the industry analysis, China purchased about 50 analog and digital computers between 1962 and 1972.

The *Asian Computer Yearbook* is available for $9 from its publisher, Computer Publications Ltd., at 22 Wyndham St., Hong Kong.

Services Revenues Seen Doubling in Five Years

SAN JOSE, Calif. — Annual revenues of the computer services industry will top $13.7 billion by 1982, more than double 1977 sales, according to a recent report from Creative Strategies International (CSI).

Compound annual growth rates were predicted at 7% to 25% depending on the segment of the industry. Remote computing will lead the race with a 25% growth rate and software products will follow closely behind at 23%, CSI said, forecasting the overall average growth rate at 16.7%.

CSI's study "The Computer Services Industry," divides the service industry into five segments: remote computing, service bureaus, facilities management, software products and software services.

Pointing to the fact that not one of the 4,500 industry firms holds more than a 9% market share and that the top 15 companies generate about 30% of the revenues, CSI contended there is sufficient incentive for small firms (those with less than $1 million in annual sales) to enter the market.

But the market, while promising does, have some barriers, CSI said. The study identified a trend toward mergers as smaller companies try to sustain growth.

Moreover, the study noted, minicomputers are beginning to invade the time-sharing and remote batch markets as customers increasingly opt for in-house capability because of decreasing hardware costs.

The study is available for $695 from CSI at Suite 275, 4340 Stevens Creek Blvd., San Jose, Calif. 95129.

Milestone for DEC

MAYNARD, Mass. — Digital Equipment Corp. recently celebrated the shipment of its 100,000th computer system. In recognition of the milestone, Kenneth H. Olsen (left), DEC president, affixed a commemorative plaque to the system, a Datasystem 570.

Celebrating with Olsen is Jerald E. Crane, director of information services for Georgia-Pacific Corp. of Portland, Ore., the user.

According to International Data Corp., a market research firm, DEC is one of two companies to produce and ship 100,000 computers.

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Boom Expected for Package, Service Firms

NEW YORK — Independent firms supplying software packages and packaged services can expect a boom through 1982 despite IBM's hold on 50% of the U.S. market, according to forecasts made in a recent study released by Frost & Sullivan, Inc., a New York-based market research firm.

The 230-page study, "Computer Software Packages and Packaged Services Market," projected growth for the software packages segment at 26% annually with dollar volume growing from $969 million this year to $2.4 billion by 1982. Threefold growth was forecast for the packaged services sector with sales estimates of $3 billion for 1982.

Opportunities will abound in the minicomputer sector as computer ownership becomes more prevalent, penetrating into businesses such as car dealerships, radio stations and medical groups. The study further predicted that IBM's unbundling trend will extend to its Series/1 mini and create opportunities for independent suppliers.

Also, demand for software packages by users of medium- and large-scale systems will grow because of increased central and auxiliary storage capacity and the enhanced communications capability of the new systems, the report said.

Particularly heavy demand was forecast for data base management systems, inventory control systems and minicomputer programming utilities as well as specific software for accounting and banking needs.

Burgeoning growth will no doubt attract many new independent software suppliers. The highly fragmented software industry is labor intensive and allows low-cost entry into the market, the researchers pointed out.

In fact, about 50% of the independent software firms employ less than 25 people and generate less than $1 million in revenues annually, according to Frost & Sullivan's industry analysis.

Although fragmented, operating patterns are beginning to emerge. Most firms specialize in creating software to serve users of specific equipment such as the IBM 360/370 or for a specific industry such as banking.

Surveys of vendors revealed that marketing expenses were 28% of sales for software packages and 14% for packaged services, with an average of 5.7 people required to support a package.

Moreover, 68% of the responding users designated independent software houses as being lower priced, having higher quality and being more flexible than manufacturers' offerings; 13% reported the opposite.

Problems facing the software industry revolve around uncertainties concerning state and local taxes on software sales as well as copyright and patent protection. However, the study indicated the dampening effect of these problems will not be too severe.

The study costs $700 and is available by contacting Customer Service, Frost & Sullivan, Inc., 106 Fulton St., New York, N.Y. 10038.

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Foreign Orders & Installations

The Twente Hospital Region based in Enschede, the Netherlands, has ordered a Univac 1100/11 system for handling patient registration and identification as well as for financial and administrative applications. A second Univac 1100/11 system has been ordered by the Dutch Foundation for Medical Registrations in Utrecht.

The Chang Hwa Commercial Bank of Taiwan, has installed an NCR Corp. V-8570 and NCR teller terminals linking five cities.

BASF Braziliers, a subsidiary of BASF A/G, a major multinational West German chemical manufacturing concern, has ordered a Univac 1100/11 valued at $1.1 million. The system is planned for installation at BASF Braziliera's headquarters in Sao Paulo.

Rechenzentrum Graz, Austria's largest computer service center, has purchased a $4 million Univac 1100/81 to handle technical-scientific applications as well as administrative tasks.

Forenede Margarinfabrikker A/S of Norway has ordered a Univac 1100/11 system to control food products from the production stage through the wholesale distribution channels. The system is valued at approximately $1 million. The order was placed with Saab Univac Norge A/S.

Computer Timesharing Ltd. of New Zealand has installed a Hewlett-Packard Co. 3000 Series II Model 6 to provide the first time-sharing computer bureau service in that country.

The Standard Chartered Bank Ltd. of the UK has ordered an NCR Corp. 7750 distributive document processing system.

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At Memorex vs. IBM Antitrust Trial

Witness Says IBM Good on Price/Performance

By Catherine Arnst
CW Staff

SAN FRANCISCO — Hughes Tool Co. in Houston, Texas, makes acquisition decisions for its computer systems solely on the basis of the best price/-performance ratio and considers all vendors, according to Ralph Leatherman, manager of information systems for Hughes and IBM's "user" witness in the Memorex vs. IBM antitrust trial.

A good price/performance ratio is the reason why Hughes' current configuration for its IBM 370/165 Model II system is virtually all IBM-manufactured and contains only one independent product — a Memorex Corp. 1270 communications controller, Leatherman claimed on the stand last week.

Leatherman had nothing but praise for Memorex's products and servicing but, he said, he had written three letters to IBM complaining about various products and maintenance support, Memorex attorneys revealed on cross-examination.

Second Occupation

Leatherman can almost list his second occupation as an IBM user witness. He was scheduled to testify in the California Computer Products, Inc. vs. IBM antitrust case if IBM had presented its defense and is one of the first of some 70 users scheduled to testify in the U.S. vs. IBM antitrust trail now going on in New York.

Prior to testifying in the Memorex case, Leatherman met 14 times with IBM lawyers regarding testimony either in this trial or the government action, for a total of approximately 80 hours from 1976 through April 16 of this year. Letters that IBM employees or attorneys sent him in thanks for his cooperation were warm and contained personal invitations to get together.

Some members of the government's trial team in New York privately claim that Leatherman has been coached by IBM to testify to a "party line" and his recent deposition in that case was a cause for dispute because of his seeming lapses of memory when answering government questions.

Leatherman had no such problem in California. He was a well-prepared and confident witness.

Acquisition Activity

Leatherman testified that acquisition decisions were a major activity of his department at Hughes, a supplier of oil field drilling tools. The firm uses DP in every aspect of its operations, from business applications to manufacturing processes, he said, and "there are some things we do now that we couldn't do before we had computers because of the mass of calculations involved."

Leatherman has a half-dozen people involved in some facet of the acquisition process, particularly in keeping abreast of developments at all times, he said. He has the final responsibility for all DP acquisition decisions.

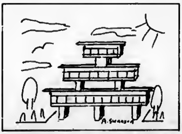
In deciding on an IBM Model 165, Hughes not only considered IBM systems, it also looked at the products of other mainframe manufacturers, the possibility of using minicomputers and the alternative of going to a service bureau. It was considered the most cost-effective to do the job with a large processor, and the Model 165 gave the best price/performance ratio, he said.

Once it leased the system from Comdisco, a third party supplier, Hughes upgraded through a series of disk subsystems manufactured either by IBM, Telex Computer Products or Memorex. The Telex and Memorex subsystems were functional equivalents of the IBM systems, and IBM finally ended up supplying Model 3350 drives for which the two plug-compatible manufacturers had not yet developed an equivalent.

Memorex did offer Hughes an interim proposal of a combination of its own 3330-type drives until its 3350 type was available; in terms of dollars, this proposal was cheaper than IBM's offer, Leatherman said. But that configuration still was not as fast as the IBM 3350s, and "it is extremely important for us to maximize our uptime," Leatherman said.

A major issue in this case is Memorex's charge that IBM CPU users are locked into either IBM peripherals or exact copies made by other manufacturers, so the smaller firms in the industry are always playing follow-the-leader to IBM's product offerings.

Leatherman characterized the computer industry as "increasingly competitive in the last 20 years," which has caused prices to be lower and more technical innovations to be introduced.



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CMI Posts Net

BEDFORD, Mass. — Cambridge Memories, Inc. (CMI) reported earnings of $550,000 or 30 cents a share for the six months. However, this figure included a $276,000 credit for net operating loss carryforwards. Therefore, net operating income was $274,000, or 15 cents a share.

In the six months, CMI posted net income before extraordinary credits of $260,000 or 16 cents a share. Extraordinary credits for that period totaled $2.7 million, resulting in net income of $3 million or $1.79 a share.

Earnings in the second quarter totaled $342,000 or 19 cents a share compared with $264,000 or 16 cents a share in the year-ago period. Revenues increased to $2.5 million compared with $1.7 million.

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Financial News

But Earnings Dip

Amdahl Tops Quarter Revenues

SUNNYVALE, Calif. — Amdahl Corp. posted record revenues of $68.7 million for the first quarter, compared with $38 million in the same period a year ago.

Earnings dipped to $9.5 million or $1.17 a share in the 1978 quarter compared with $10.1 million or $1.30 a share in the 1977 period, but the 1977 figures reflected an extraordinary credit of over $5 million for a tax-loss carryforward, which greatly enhanced earnings.

Without the extraordinary item, 1977 quarter earnings would have been $5.3 million or 69 cents a share.

The prices of Amdahl's computer systems were down 35% from last year at the same time, the company stated.

Amdahl also revealed a price reduction on the memory portion of the 470V/5 and 470V/6-II systems that will lower the price of a typical system by about 5%.

Further the V/5 and V/6 systems are now offered in a minimum configuration of eight channels, and customers can add up to eight additional channels to each system in four-channel increments.

New international markets were opened in Australia, Denmark, France and Italy the firm reported.

Sycor Net Hits $553,000

ANN ARBOR, Mich. — Sycor, Inc. reported first-quarter earnings of $553,000 or 16 cents a share on revenues of $20.5 million compared with last year's first-quarter earnings of $343,000 or 10 cents a share on revenues of $17.2 million.

First-quarter income after taxes was reduced by a one-time expense of $150,000 in connection with Sycor's proposed merger with Northern Telecom Ltd. The merger is still subject to approval by Sycor stockholders and the fulfillment of conditions of the U.S. Internal Revenue Service.

Rental and service revenues were 27% higher than in the same period a year ago. Outright sales to foreign customers increased 47%, but North American sales slipped 28% resulting in an overall outright sales increase of 12%.

Nickels & Dimes

Beehive International announced increased credit lines with Wells Fargo Co. and Walker Bank & Trust. The $7 million credit line, comprised of a short-term note and a revolving term note, reflects a $1.5 million increase in credit availability.

$$$

Boothe Courier Corp. sold its capital stock of subsidiary Courier Terminal Systems, Inc. to International Telephone and Telegraph Corp. After deferred taxes, Boothe will realize net proceeds of about $40 million.

$$$

Inforex, Inc. has filed a registration statement with the Securities and Exchange Commission for a proposed public offering of 15,000 units consisting of subordinated debentures due 1998 and common stock. Each unit will consist of one $1,000 debenture and a number of shares of common stock to be determined at the time of the offering.

$$$

Scan-Data Corp. expects to report a $1 million loss for 1977. The company is in a preliminary discussion stage for a cooperative business arrangement with a major company and a minority involvement in Scan-Data by that company.

$$$

Computer Devices, Inc. (CDI), has negotiated an $8 million line of credit. According to Kendall Wright, president of CDI, $4 million will be available with the New England Merchants National Bank of Boston for lease financing and working capital and another $4 million will come from U.S. Portfolio Leasing of San Francisco for computer terminal leasing.

Pertec Computer Corp. has established new lines of credit and set up a wholly owned unconsolidated financial subsidiary, Pertec Computer Financial Corp. The credit agreements provide a total of $55 million in financing, $25 million of which will be used by the subsidiary.

$$$

Itel Corp., in two separate financings, has placed $122 million of 15-year equipment trust certificates with a group of institutional investors led by Aetna Life Insurance Co., Morgan Guaranty Trust of New York, Connecticut General Life Insurance Co. and The Travelers Insurance Co.

NCSS Reports Record Revenues

NORWALK, Conn. — National CSS, Inc. (NCSS) reported record revenues of $48.8 million for the year ended Feb. 28 compared with $41.7 million in the previous year.

Year earnings increased to $3.8 million or $1.68 a share compared with $3.2 million or $1.4 in the prior year.

The services company recently announced its entry into the minicomputer market with its 3200 series system, a 32-bit supermini compatible with the IBM 370 series.

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Medical Groups Seen Fertile Market for Micros

NEW YORK — Over the next 10 years, medical group practices, clinics and health maintenance organizations (HMOs) will be the major segments of a projected $1.3 billion market for microcomputer-based medical systems, according to a report released by Frost & Sullivan, Inc.

These groups will account for sales of $1.1 billion, with small hospitals and multiphasic screening centers rounding out the total market, which is forecast to peak in the late '80s, leveling off at $250 million per year by that time.

However, these estimates are considered conservative because they do not include sales of related supplies and software; new technological advances in microcomputing capability or medical science; or secondary care delivery systems such as medical laboratories where microcomputer applications would be suitable, the report said.

To date, the minicomputer option has not been feasible for these sectors of the medical care industry because of the relatively low volume of use compared with the system costs and the added expense of clerks and technicians required to support such systems.

In contrast, a single microcomputer system in combination with related peripherals could emulate the functions of a minicomputer system used in large hospitals, Frost & Sullivan suggested.

Adverse features of microcomputers have been their comparative limitations in speed and capacity and their limited capability to interface with many peripherals simultaneously.

But now, with improved chip structure, a retrieval time of 45 nsec compares favorably with minicomputer performance.

With this one disadvantage disappearing, microcomputers can do most of the smaller jobs now done by minicomputers at considerably lower prices — $500 for a typical expandable microcomputer as opposed to $2,500 for minis, the report said.

Although interfacing a battery of peripherals brings the total costs higher, the micro uses less expensive and fewer peripherals, it added.

Another advantage of the microcomputer cited by the study is that its random-access memory and read-only memories are durable, low-cost chips that can be easily and economically changed for new applications or maintenance.

Finally, the microcomputer has been fitted with floppy disks which are ideally suited for patients' business and medical records data, Frost & Sullivan noted.

Applications Sectors

The two major uses for micro-based medical systems in the primary care medical market (nonhospital) are administrative and clinical DP, with the clinical sector projected to account for more than $1 billion in sales during the 10-year forecast period.

Societal pressure for preventive medicine will fuel the demand for complete periodic medical examinations, which will regularly consist of a battery of tests, many of which could be automated.

In addition, health insurors and governmental payers are demanding greater cost effectiveness for health care and are accepting prepaid health plans (HMOs) and comprehensive group practices as a move in the right direction, thereby creating greater consumer demand for primary health care services, Frost & Sullivan noted.

In fact, the study observed 30 socioeconomic-political factors and 50 technological developments projected to contribute to the demand for microcomputer-based medical systems.

Of the physicians surveyed, 89% expressed interest in an automated system to handle physical exams and related clerical transactions.

Although the market potential is great, marketers have some difficulties to overcome. One particularly important hurdle is that medical instrumentation manufacturers are highly specialized and quite fragmented, with only a few makers interested in integrated instrument systems, the report noted.

The complete report is available from Frost & Sullivan, Inc. at 106 Fulton St., New York, N.Y. 10038.

Executive Corner

- Display Data Corp. has promoted John Cibula to vice-president of product development; Edmund LaRocca to vice-president of engineering; and David Sykes to vice-president for installation management.
- Grant L. Hansen has been named president of System Development Corp.'s Systems Group.
- Eliott D. James has been promoted to vice-president general manager of Harris Corp.'s Data Communications Division.
- Edgar M. Reynolds has been appointed president of Digital Products Corp.
- Robert W. Howe has been promoted to the position of executive vice-president of operations at Savings Management Corp.
- Ralph N. Miller has been promoted to vice-president of financial systems development at Cibar, Inc.
- Louis E. Pfeiffer has resigned as director of marketing at A.O. Smith Data Systems Division to become vice-president of marketing at Data Processing of the South, Inc.
- Karl H. Geng has been appointed vice-president for services in the Computer-Aided Design and Manufacturing Division of the Computervision Corp.
- Process Computer Systems, Inc. has named Tony Thomas vice-president of operations.
- Richard V. Palermo has been promoted to senior vice-president and general manager of peripherals at Datapoint Corp.
- Peter Preuss has become president of Integrated Software Systems Corp. of San Diego, Calif.
- Kenneth H. Agress has joined Computer Systems of America, Inc. as vice-president of marketing.
- Parker A. Stacy III has been appointed senior vice-president and treasurer of Mini-Computer Systems, Inc.
- Vincent J. DeSimone has joined Brandon Applied Systems, Inc. as vice-president of finance and administration. He succeeds vice-president Ronald S. Edwards Jr. who has been named assistant to the president for contractural matters and who will continue as secretary of the corporation.
- Robert J. Deffeyes has been elected president and chief executive officer of Graham Magnetics, Inc. of Graham and Fort Worth, Texas.
- Harry J. Clark has been appointed controller and chief financial officer at Computer Optics, Inc.
- Dean R. McKay, IBM senior vice-president, has been appointed a member of the company's corporate management committee. John F. Akers, IBM vice-president, succeeds McKay as group executive for the Data Processing Marketing Group.
- Evelyn Berezin has been appointed director of planning for electronic systems and equipment with Burroughs Corp.'s Office Products Group. Robert S. Scheidemantel Jr. succeeds Berezin as Redactron's president.
- Raymond E. Valle has been named general manager for Memorex Corp.'s CFI division.
- Gordon F. Gilchrest has become a senior vice-president of Insco Systems of Neptune, N.J.
- Rudolph P. Roscher has joined the Perkin-Elmer Corp. in its Data Systems Group, sales/service division, as vice-president of domestic sales for Interdata products.
- Bernard J. Fisher has been elected corporate vice-president of Data 100 Corp.
- Salvatore J. Cafiero, William J. Barron, Kemerer Edwards and Dwane L. Spohn have become senior vice-presidents at Insco Systems.

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Cross Took ICL Through 'Awe-Inspiring Years'

By Ivan Berenyi
Special to CW

LONDON — Early this year — just days before a five-year-old option expired — Geoffrey Cross, departed managing director of the UK International Computers Ltd. (ICL), bought 100,000 shares, at about $2.70 a share, in the company he headed until November 1977. The same day, ICL shares were changing hands on the stock market at about $4.50 each.

That bare transaction says a lot about Cross and about ICL. It was thanks to Cross and his five awe-inspiring years at ICL that the shares had reached such eminence. It was typical of the man that he should both cash in on his success and wait as long as possible before doing so in the hope that the stock would reach a record peak. When it comes to brinksmanship, colleagues testify, Cross is no man to play games with.

The happy position of ICL shareholders at the close of 1977 stemmed directly from the company's immensely improved trading profile in the wake of its takeover of Singer Business Machines' international interests, and of the former Cogar Corp. in the US. Cross had prophesied turnover of about $728 million; in fact it was about $762 million — a phenomenal 45% higher than the previous year. Pretax profits were up, too; at about $55.1 million, 31% above fiscal 1976.

The good news was marred only by Cross' hurried departure from the company. No satisfactory explanation has yet emerged for this. The architect of one of the biggest success stories in Britain for years left his company just 1-1/2 months before the figures that would confirm that success were to be published. It is so unlike Cross that speculation immediately began as to what lay behind his move. The publicly stated reason — his children's bronchitis — was never taken seriously.

There is no doubt that Cross' convoluted financial arrangements with ICL — under which he was repaid double taxation through a shadowy U.S. company called G.R. Cross & Associates, Inc. — had embarassed both him and the UK government, which appeared to have connived at breaches of its own pay restraint policy.

It has been suggested that a too-keen interest in the details of his contract by Britain's tax authorities — together with the ICL board's hesitation to get his bonus paid through Plessey-U.S. once the Cross & Associates laundry operation had been uncovered — contributed to his decision, but that has never been unequivocally confirmed.

Frustrations With Firm

There is no doubt that Cross was beginning to feel frustrated at ICL. He had publicly despaired of ever shedding the 7,000 superfluous workers whom he believed stood between ICL and long-term profitability; Britain's all-powerful unions would never let him remove more than 2,500 employees.

He wanted ICL to continue on the highly lucrative acquisition trail following the Singer deal, but the government — thinly disguised as the National Enterprise Board, ICL's major shareholder — had gotten cold feet and firmly turned down a no less spectacular stalk of minicomputer manufacturer Data General Corp.

What had not emerged at the time — or anyway, what had been ignored in the general euphoria over ICL's recovery from the rocky early '70s — was the growing trouble with the new 2900 range of large systems.

Warning notes had certainly been sounded. One major university user had castigated the top-of-the-range 2980 as so slow that it was outperformed by ICL's obsolete 1906A. The British Steel Corp. had very damagingly announced that the new ICL range was not even going to be considered for the next round of hardware replacements.

But a thick layer of public relations had been laid over the teething problems of the new range. No one disputes the sophistication of the architecture; it is the operating software that causes the headaches.

When Geoffrey Cross took over at ICL, an operating system known as System B was at an advanced stage of development. It was later to become the VME/B operating system of the larger 2970 and 2980 models in the new range.

Credibility Gap

But at a critical point, Ed Mack, longtime associate of Cross with whom he had formerly worked at Univac, was appointed to head software development for the new machines. Mack, whose experience was entirely with transaction-oriented systems, had little sympathy for the all-purpose system B concept and removed many of the most talented software men from the team to work on a new system that was to become VME/K, implemented on the smaller 2950 and 2960 machines.

The result is that a large credibility gap hangs today over both systems, but particularly over VME/B. A report by Edinburgh University, one of the first 2980 users, showed that in mid-1977 the mean time between system crashes was as low as 3.9 hours. Later the university reported that this had actually declined to 3.8 hours after the introduction of the latest release, known as SV21.

At the end of February this year, a UK government watchdog committee on public spending reported that the delays to full operational performance of the new 2900 systems had cost Britain "many millions of pounds." It cited just two Ministry of Defense systems that had incurred costs above their budget of about $18 million because of operational inadequacies.

The report from the comptroller and auditor-general came just days after Reay Atkinson, head of the Central Computer Agency, which buys all the government's hardware, effectively gave ICL notice that it could no longer rely on preferential treatment if its equipment did not come up to scratch.

For American users, much of this is academic, since the change of ICL's ever selling a 2970 or 2980 in the U.S. is fairly remote. Most of ICL, Inc.'s customers are users either of the highly successful 2903 small business system and its derivatives, or — latterly — of Singer/Cogar 1500 intelligent terminals.

But if the large 2900 series should prove complete white elephants, the implications for ICL's long-term survival could be very serious.

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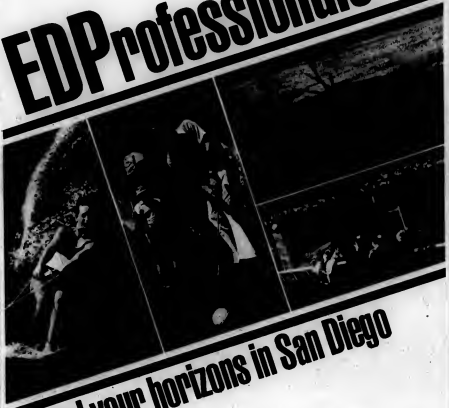

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We have many clients in the sunny recreational sunbelt area looking for programmers, programmer analysts, system analysts, and systems programmers with IBM (OS or DOS) cobol, burroughs, assembler, BAL or CICS experience. Salaries $14,000 to $25,000. Submit resume with current and required salary, relocation preference to:

Executive Recruiters
Personnel Agcy., Inc.
3700 Cantrell Suite 104
Little Rock, AR 72202
(501) 664-3313

SYSTEMS DESIGNER

SCIENTIFIC APPLICATIONS

We have a position available in our Computer Sciences Department responsible for the design, implementation, and operation of programs for our research division to organize, edit, and analyze data involved in clinical investigations for our Company. Educational and experience requirements include a B.S. or M.S. degree in Computer Sciences with significant academic training in the biological or chemical sciences. You will work with an IBM 370/158 system, as well as other mini-computer systems.

Mead Johnson & Company is a quality pharmaceutical and nutritional products manufacturer located in an attractive midwestern community. We offer an exceptional compensation and benefits package to the qualified individual filling this position.

If qualified, please send your resume in confidence to:

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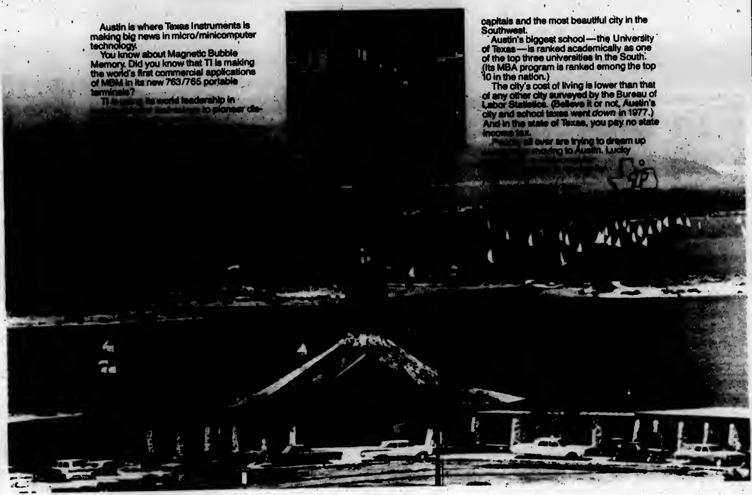

Austin is where Texas Instruments is making big news in micro/minicomputer technology.

You know about Magnetic Bubble Memory. Did you know that TI is making the world's first commercial applications of MBM in its new 763/765 portable terminals?

TI [illegible] its world leadership in [illegible] to pioneer dis- [illegible] capitals and the most beautiful city in the Southwest.

Austin's biggest school—the University of Texas—is ranked academically as one of the top three universities in the South. (Its MBA program is ranked among the top 10 in the nation.)

The city's cost of living is lower than that of any other city surveyed by the Bureau of Labor Statistics. (Believe it or not, Austin's city and school taxes went *down* in 1977.) And in the state of Texas, you pay no state income tax.

[illegible] all over are trying to dream up [illegible] moving to Austin. Lucky [illegible]

Atlanta Interviews:

Design Engineers
Experience in memory or microprocessor systems design with 1-5 years' experience and a BSEE or equivalent. Opportunities in peripheral interfaces, disc controllers, bubble memory controllers, advanced systems controllers, and multimicroprocessor computers.

Production Test Engineer
Design, development and support of sophisticated test equipment and requirements for new minicomputer and terminal products. BSEE with 1-10 years' experience in computer logic design, checkout or test software experience desirable.

Product Service Engineer
Support new computer products from conception to field maturity with a BSEE and 2 or more years' in design or sustaining of minicomputers/peripherals.

Reliability Engineer
Perform detail stress analysis, reliability predictions, and life testing of new minicomputer products with 1-4 years' experience and BSEE.

Product Marketing Engineer
Support field engineering, analyze customer systems applications, competitive market analysis, and market planning/execution with an MBA and undergraduate technical degree with 1-5 years' computer experience.

Marketing Analyst
Responsibilities through marketing for software products including research, competitive analysis, and coordination with software development. Must have a CS degree.

Product Marketing Planning Manager
Responsible for long-range planning of computer and systems products, market segment definition, market share studies for minicomputers. 5-7 years' experience in computer marketing.

Audit Analyst
Individual selected for these positions will conduct in-depth technical analysis of new software products and product development for quality and usability.

Software Support Programmer
Duties will require maintenance of existing software packages and assist in our nationwide field operation.

Systems Development Programmer
Opportunities on a new project of multimicroprocessor products using the latest memory architecture. Opportunities also include design of new operating systems for follow-on products.

Applications Programmer
Project member for commercial, industrial or business systems departments having direct contact with customers doing software product development.

Diagnostics Programmer
Design/development of intensive unit/systems level diagnostic software for 990 computers in a standalone and real-time environment.

Business Programmer
Design new systems with COBOL to satisfy the needs of a small business computer user.

Applicants for these programming positions must possess a background in one or more of the following areas: microprocessors, operating systems, distributive processing networks, assembly and higher level languages. Requirements also include ability to communicate effectively, desire to work with customers, and a BS in CS, EE or Math.

Technical Instructors
Good communicator desiring to teach customers/field personnel in latest hardware/software products. Technical background with master's and teaching experience desired.

Project Leader
Responsibilities include supervision of engineers/technicians on projects related to bubble memory, advanced displays. Requires 4-7 years' minicomputer leadership experience.

Atlanta Interviews
Wed., Thurs., & Fri., May 10, 11 & 12.
Call Lee Cooke at (404) 892-6856
from 9AM to 8PM Wed. or Thurs.,
or from 9AM to 3PM Fri.
To arrange an interview in
advance, call Lee Cooke at
(512) 258-7242.

If unable to arrange an interview on these dates, send your resume in confidence to: Lee Cooke/P.O. Box 2909, M.S. 2106, Dept. 8399/Austin, TX 78769.

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Jit Saxena, *Department Manager, Data Base, Data Communications Software*

"Traditional approaches to software are not the rule at Data General. We reward initiative and creativity instead. That's Data General's philosophy—where some companies want you to define a product and let others handle the execution, here you have the opportunity to do everything from definition to final testing. We actually put fewer bodies on a project than other companies. For us it's more efficient. For you it's more visibility, more identity…more chance for success."

In 1973, Jit Saxena came to Data General as a Systems Engineer in the field. Today he heads the department responsible for all software related to Distributed Processing Systems. And right now he has a number of career opportunities for Software Professionals in state-of-the-art development of Data Communications and Data Base Management Software at our Corporate Headquarters in Westboro.

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We are looking for Software Specialists with experience in real time operating systems design who are also familiar with communications protocols like HDLC, BISYNC, existing networks similar to SNA, and software handling for intelligent terminals.

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Here we need professionals who understand data base and file utilities, interactive query languages, transaction processing systems, performance analysis, concurrent upgrade control and recovery, distributed data base processing or data manipulation and description languages.

Both groups offer challenging technical opportunities with considerable room for long-term career growth. If you would like to explore these or other software positions, call Jim Stewart at (617) 366-8911, ext. 3065, Monday through Friday, between 9 a.m. and 6 p.m. Or send your resume to him at Data General Corp., 15 Turnpike Road, Westboro, MA 01581.

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- Knowledge of MMIS general design; electronic data processing systems analysis, design and capabilities.
- Knowledge of MMIS requirements for Federal reimbursement; medical terminology, data processing, medicaid and MMIS terminology; principles and practices of management, supervision and staff development.
- Knowledge of the Medicaid program; programming; governmental budgeting; DP system security.

This is an outstanding opportunity in a pleasant location; excellent fringe benefits. For more information and application, write or call:

Joan Bronson, Personnel
Health & Welfare
Statehouse
Boise, ID 83720
(208) 384-2825

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Because we have a challenge and an opportunity to put new growth in your career. Besides offering excellent salary and benefits and all the normal perks, here is your opportunity to impact both the manufacture and distribution of our advanced electronic equipment, as well as administration.

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(301) 864-5600

Amecom Division

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COMPUTER PROGRAMMING PROFESSIONALS

Control Data Corporation has career growth opportunities in pre-sale, post-sale and consulting located throughout the United States.

APPLICATIONS

Applicants should have experience in one of the following areas:

- **Programmer/Design Analysts**
  (Opportunities in Detroit, San Francisco Bay Area and Washington, D.C.).
  Various levels are now open to candidates with one or more of the following:
  COBOL, FORTRAN, BASIC
  Interactive Information Systems
  Quantitative Analysis
  CDC 6600/7600, CYBER 70 or 170 series
  IBM 370/360 OS, VS
- **Data Base Analysts**
  (Opportunities in Detroit, Minneapolis, and Washington, D.C.)
  COBOL, FORTRAN
  Total System 2000 IMS SPSS
- **Software Develop,ent**
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  Requirements analysis
  General and detailed design
  Systems analysis
  Project leadership
  Information systems implementation
  Knowledge of time sharing usage

OPERATING SYSTEMS

Applicants should have experience in maintaining, modifying or extending any one of the following operating systems:

- **CYBER 17X or 6000 with**
  NOS, NOS/BE, SCOPE or KRONOS (Opportunities in Austin, Albuquerque, Boston, Chicago, Denver, Detroit, Fredericksburg, Livermore, New Jersey, Philadelphia, St. Louis, and San Francisco Bay Area).
- **System 370 or 360 with DOS**
  VS, VSI, SVS or MVS (Opportunities in Boston, Detroit, Milwaukee, Minneapolis, New York, Philadelphia, Pittsburgh, and Washingtoo, D.C.)
- **CYBER 18 with 1700 MSOS, RCOS or ITOS**
  (Opportunities in Dallas, Los Angeles, and Minneapolis)
- **PDP-11 with RSX-11M**
  (These positions in the San Francisco Bay Area)
- **Intel 8080**
  Or other microprocessors
  (These positions in the Philadelphia Area).

or have extensive assembly language on any of the above computers.

For immediate consideration, please send resume, salary history and geographical preference to: John N. Powers at the address below

or if you are attending the National Computer Conference in Anaheim, call Mike Pelto from June 5-8 at Sheraton, Anaheim (714) 778-1700.

CONTROL DATA CORPORATION

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60 Hickory Dr., Waltham, Mass. 02154
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Embedded Computer Software
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You will work in a project-team environment that will enhance your professional development. Also, you will participate in an excellent benefits program that includes, but is not limited to, a company-paid ten-part insurance plan, two pension plans (one company-paid), personal investment plan, stock purchase plan and a 100% tuition refund program.

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Baltimore, MD 21203
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Portland, Oregon 97205
(503) 224-6860

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> We are using top down design, structured programming, structured design techniques, Warnier diagrams, and structured walk throughs . . .
>
> We are totally dedicated to IMS and are presently using 1.1.4 and are in the process of developing a sophisticated teleprocessing network in the United States to support over 20 operating divisions from New York to California.

WHERE DO YOU FIT IN?

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We are presently looking for several Intermediate Programmer/Analysts and are fully prepared to train in the latest State-of-the-Art techniques. If you have solid analytical skills through two or more years work experience in OS, COBOL, and will dedicate yourself toward personal development and excellence, we will provide you the opportunity, training, and climate to truly become a current professional in management information systems.

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If your background includes experience with physical and logical data base design, and knowledge of IMS utilities and how performance tools are utilized, we would like to discuss your being involved in our exciting Data Base Administration group that is currently involved in a very large scale development activity.

Your opportunity is now! As one of our software professionals, you will enjoy our technically challenging and highly professional work environment. We offer excellent compensation and benefits, including paid relocation.

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Mr. Frank McKain
Systems Research & Development, Room C-313
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222 W. 7th St. Cincinnati, Ohio 45202
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- Interface to software maintenance and development
- Customer interface & communications
- Problem tracking & resolution
- Home office national systems support
- Support of NCS system
- Installation
- Sys-Gen pre-shipment checkout

Special requirements for this position include knowledge of assembly language, minicomputer 360/370 JCL, and systems programming; systems support experience; and data communications (e.g., 3705 Cpm 10 message switching).

PROGRAMMER/ANALYST

- Maintain and enhance NCS
- Sys-Gen and other CCI utilities written in 360/370 macro-assembler language
- Writing TP programs using BTAM and assembler language macros.

Special requirements for this position include knowledge of BTAM 360/370 macro language, including 360/370 assembler, 360/370 macros, 360/370 OS and OS JCL; and familiarity with teleprocessing a must.

For immediate consideration, please contact our National Recruiter by calling collect or sending a resume:

Anthony Wattenback
(213) 274-5328
9701 Wilshire Boulevard, Suite #805
Beverly Hills, Calif. 90212
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INFORMATION SYSTEMS PROGRAMMERS/ANALYSTS

General Electric-Aircraft Engine Group . . . creating major breakthroughs in jet engine technology, can help you create a major breakthrough in your career, if you have the expertise to design, develop and program new or revised information systems.

Openings at both Cincinnati, Ohio and Lynn, Massachusetts facilities require a degree in Computer Science or equivalent experience and full knowledge of design, programming and implementation of information systems using COBOL on large and/or miniscale general purpose computers. Familiarity with Honeywell 6000 hardware/software is a plus factor. Solid experience in a manufacturing environment as well as knowledge of data base systems design and on-line processing applications are highly desirable.

Selected applicants will enjoy high visibility in an organization known for recognizing and rewarding achievement. Compensation is based on qualifications and experience. Benefits are outstanding. For immediate confidential consideration, send resume with salary history to geographic preference:

Mr. D. Atencio, Ref. 48B
General Electric
Bldg. 800, C-15
Cincinnati, O. 45215

Mr. F.T. Anderson, Ref. 48B
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Lynn, Mass. 01910

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The nation's leading text processing organization is looking for a pro to participate in the expansion of our Photocomposition Software into new and uncharted areas.

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.Data Base Administrators
.Systems Programmers
.Mini-Computer Systems Designers

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Qyx is currently installing CDC-OMEGA 480-II computer systems running under VM and OS/VS1 operating systems. Individuals with experience in the following areas are required:

- VS1 Internals including VSAM
- VM/CMS Internals
- Remote Job Entry Software
- Total DBMS Management
- File Structures & Design
- On-line Systems (Environ/1)
- Interactive Inquiry
- On-Line Data Entry Systems
- Communications Design Concept
- Network Design & Management
- Performance Measurement
- Standards Development

A nationwide mini-computer network to support marketing activities is being installed. Individuals with broad experience in mini-computer networks, systems software and marketing applications software, (order entry, field inventory, etc.) are required. A Technical Degree with 3 years experience in data base processing techniques and systems programming preferred.

Qualified individuals should send resume and salary requirements to: Mr. R.H. Thurman, Qyx, Division of Exxon Enterprises Inc., P.O. Box 429, Exton, Pa. 19341. Minorities and females are encouraged to apply.

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(405) 525-8833

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is needed in the Developmental and Special Services Group for the Educational Network in West Virginia. The responsibilities will include consultation on DEC and IBM hardware/software, provision of seminars and documentation, applications analysis and programming. Applicants should have at least one year of experience providing similar services preferably in a mixed vendor network environment and should possess good oral and written communication skills. A college degree in an engineering, scientific, or computer discipline or equivalent is required. Apply by May 26 to Dick Bryan, WVNET, 837 Chestnut Ridge Road, Morgantown, WV 26505 (304) 293-5192.

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DP ADMINISTRATOR I

The Clemson University Computer Center is seeking a DP Administrator I to direct the operations group of the Center, and to provide assistance in the areas of hardware and facilities planning. Desired qualifications include a bachelors degree, substantial operations and hardware experience on large-scale IBM equipment, and five years of supervisory experience. Salary range $18,012 - $25,599. Please send resume to:

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Computer Center
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Performs research on circuits, systems and subsystems and related hardware and software in order to provide management with information on concept feasibility and estimated system cost for design and development. Efforts involve providing existing services with new techniques and/or new services on existing equipment.

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Long Range Planning activities involve research studies on a wide variety of subjects related to the telephone communications industry. These studies include such areas as data communications, new technology, new services, future switching networks, evaluation of new switching techniques and review of the impact of political, economic and regulatory considerations. Intent is to provide well founded counsel and recommendations to upper management on future development programs and courses of action.

SYSTEMS DESIGN

New Feature Design — Plan and develop the future hardware and software evolution of current large scale fully stored program controlled switching systems. Develop new features for existing equipment, study new features impact on existing systems, and estimate the development costs and requirements.

Product Design — Design advanced fully stored program controlled systems for telecommunication application. Develop large scale software programs in an on-line, real-time environment and related digital hardware using CMOS, Schottky, TTL as well as Static and Dynamic MOS.

International Design — Develop design philosophy and Architecture Definition of switching systems for international markets. This involves high level design structure development and detailed studies of critical problem areas. Define specific design implementation tasks, review progress and coordinate developments with implementation teams abroad.

SOFTWARE DESIGN

Data Base Software—Responsible for logical and physical data base design and implementation related to telecommunications systems. Develop programs which automate the generation of data base contents for these systems in an IBM 370 environment using PL/1.

Support Software—Involved in compiler, assembler, simulator maintenance and enhancement as well as other IBM 370 software developments. Support effort is related to micro and large processor developments.

Application Software—Large scale development in telephone system real-time control Diagnostic and fault recognition software, administrative software involving real-time data base administration, switch and network overload procedures as well as executive software.

SYSTEMS CONTROL AND TESTING

Development and execution of comprehensive test plans to evaluate the performance of large stored program switching system prototypes. Execute configuration management on all hardware, software, and components and maintain project control for all activities. System evaluation performed on both laboratory prototypes and initial field site locations.

If you have in-depth expertise in one or more of these areas, and a BS, MS or PhD in Electrical Engineering, Computer Science, Math or other appropriate engineering discipline as well as an interest in moving forward with challenging new frontier in computer technology talk with us.

If unable to call, send resume including recent salary history to:

Manager of Technical Employment
Dept. 471 A6
GTE AUTOMATIC ELECTRIC LABORATORIES
400 N. Wolf Road
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Experience with PDP 11 FORTRAN Basic and Data Communication is required. A knowledge of IBM 370 PL/1 is desirable. Position involves application and systems programming. Supervisory potential.

Salary open depending on qualifications and experience. Excellent benefits. Send resume including salary requirements to:

INTERNATIONAL GRAPHICS
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(714) 578-8200

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Sales Engineer

Zimpro, Inc., a leader in the wastewater treatment and resource recovery, has an excellent career opportunity for an individual with minimum of two years experience in direct or related microprocessor-based control system sales and marketing. Responsibilities include cost and pricing procedures, technical specifications, papers, sales literature, market planning, competitive strategy, etc. Looking for a BSEE desiring growth potential into product management.

Please send resume and salary requirements in strict confidence to:

Mr. Tad Stehly

ZIMPRO
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We Need GOOD People !

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New York, Chicago, Philadelphia, Dallas, and Los Angeles

Time-sharing, RJE services, and applications software sales opportunities.

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New York, Washington, DC, St. Petersburg, Detroit and Tulsa

Installation support, customer training, and technical sales presentations. Fortran e, COBOL a must, plus some system exposure and familiarity with 1100 OS. Good communicetive skills required.

SYSTEMS DEVELOPMENT
Dallas

Maintain and enhance NOS/BE operating System. Participate in long range system plenning, product definition and support. PP-CP assembly required.

System modification end generetion dump enelysis end trouble shooting internals of 1100/OS exec. 1100 Sleuth e must.

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New York, St. Patersburg, Detroit and Tulsa

Installetion support bench merking and fine-tuning applications for large renge of customers using 6000 service under NOS/BE Fortran and Compass e must.

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Technical support of applications in nuclear industry. Fortran a must. Desire 6600 meinframe experience.

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SYSTEMS ANALYST
Dallas

Installetion, modification, quelity assurence of COBOL end Fortren Compilers end associeted execution libraries.

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Maintain multiple coupled 1108's.

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We offer competitive saleries, excellent fringe benefits end the opportunity for growth in e results-oriented environment. For an appointament, call or send a resume with salery history to Gene D. Afseth, Menager of Employment, University Computing Company, P.O. Box 47911, Dallas, Texas 75247 or call (214) 655-8715.

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Self-starter, creative and affective communicator with technical know-how PIX Sys., 360/370 DOS & DS configurations. An implementor who works effectively with in-house devel., customers and top mgt. Could quickly be identified as heir to top mgt slot. Submit resume end present Compensation to:

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A SYSTEMS ANALYST

is needed in the Developmental and Special Services Group for the Educational Network in West Virginia. The responsibilities will include consultation on DEC and IBM hardware/software, provision of seminars and documentation, applications analysis and programming. Applicants should have at least one year of experience providing similar services preferably in a mixed vendor network environment and should possess good oral and written communication skills. A college degree in an engineering, scientific, or computer discipline or equivalent is required. Apply by May 26 to Dick Bryan, WVNET, 837 Chestnut Ridge Road, Morgantown, WV 26505 (304) 293-5192.

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Programming Opportunities

About Datapoint:

Datapoint is the leader in "Dispersed Date Processing", with profitable sales in excess of $103 million. Datapoint has experienced e continuous annual growth of 45% for the past five years, with the last quarter setting new records in all areas.

About Programming Opportunities:

Positions require a minimum of 1 year of programming experience and e B.S. in Computer-Science or equivalent. Your function will be to write new programs end modify existing programs. Duties will include coding, testing end implementing new programs, modifying existing programs, and essisting in the analysis and design of programs. You will also write user documentation for programs and prepare reguler status reports.

About San Antonio:

San Antonio, the corporate headquarters, has excellent year round climate, no state or city income tax, low cost of living, excellent schools, hospitals, culturel activities end outstanding residential areas.

We offer an outstanding compensation package end every opportunity for both personal end professional growth.

Qualified applicants ere invited to send resume with salery history, in confidence, to Dan Haynes, Datapoint Corporation, 9725 Datapoint Drive, Mail Station M-83, San Antonio, Texas 78284.

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As part of a team that has corporate responsibility for test software, you will be designing software and firmware test systems for microprocessor control computer systems and associated peripherals. Specific areas include telecommunications, I/O processing, on-line and off-line system testing and much more. In new product development, you will be involved from the design stage through the manufacturing process to customer engineering user interface, solving problems and suggesting design changes where necessary. This is a high-visibility position, offering responsibility and exceptional growth potential. The ideal candidate will have a BS in Engineering and an understanding of computer architecture and logic design, and experience in assembly language programming, preferably 8080, and previous test software development experience a definite plus.

Systems Programmers

As a leading manufacturer of sophisticated computer systems and related peripheral devices, Wang is constantly on the front line of systems development. Right now, we're redeveloping a microprocessing network into a dynamite general purpose computer. The research and development group engaged in this project requires the immediate aid of several sharp programmers. For generally creative individuals, this is an excellent opportunity to help formulate new technologies in a dynamic environment. To excel in these positions, you should have topflight experience in compilers, linkers, data entry, word processing, PL/M, PL/1, LISP and/or BASIC. An MS degree is preferred.

If you have insight to offer, the place for you is Wang.

Computer Architecture

The advanced research group at Wang Laboratories is investigating new computer architecture for future implementation in our new products. If loose and tightly coupled multiprocessor systems, distributed data management, network architecture and new CPU design are the kinds of problems you wish to investigate, please send in your resume.

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Design and development of systems software for data communications on Wang's computer and word processing systems in an R&D environment. Minimum 2-3 years experience assembly language and one higher level language, plus BS/MS desired.

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We offer salaries commensurate with experience and ability and comprehensive benefits. Please send resume, including salary history, to Stephen E. Pitt, Manager Professional Recruiting, Wang Laboratories, Inc., One Industrial Avenue, Lowell, MA 01851. (617) 851-4111, and/or call our TOLL FREE NUMBER 1-800-225-0654 (please specify account number 02179).

Interviews can be arranged during the IEEE Conference on Software Engineering. Call Mr. Eugene Cosloy at (404) 577-1760 at the Hyatt Regency Hotel in Atlanta, Georgia on May 10th, 11th and 12th.

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COMPUTER PROFESSIONALS

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PROGRAMMER/ANALYST

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We seek an individual with previous management experience. IBM 360/370 DOS and knowledge of ICL preferred. Current system is IBM 360/50 EDOS.

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Manager of National Accounts

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We are seeking a Manager of National Accounts who is a data processing professional with 7-10 years experience. Supervisory background is required with exposure to national accounts helpful. The ability to deal with top customer executives as well as internal managers is a must. You must be a problem solver with the ability to supervise individuals whose goal will be customer satisfaction. You will report to the Vice President of Field Operations.

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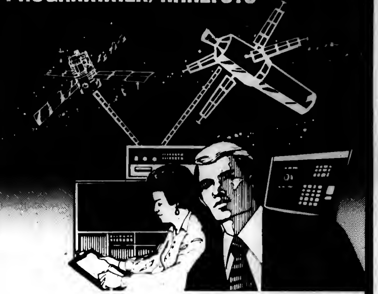
CSC

PROGRAMMER/ANALYSTS



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MANAGER OF COMPUTER SYSTEMS

The Manager of Computer Systems is responsible for all system generation and maintenance as well as recommending and maintaining all hardware related to the central computer system, a Honeywell/Xerox Sigma-7. In this capacity, the manager of computer systems is the primary interface between Bucknell and various hardware and software vendors. Minimum requirements for this position are a bachelor's degree and 2-3 years experience in operating system software including a knowledge of machine architecture. Familiarity with CP-V or Honeywell/Xerox Sigma or 560 series computers is preferred.

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Mr. Jon E. Eschinger, Assistant Director
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Senior Programmer Analysts

(Applications and Software)

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BASF

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MANAGER SYSTEMS PROGRAMMING

A Houston based Data Processing company has a requirement for an experienced manager of Systems Programming.

Ideal background for this large, multiple - CPU, online, OS/VS installation would include 2-4 years experience in management of a Systems Programming function in a commercial organization with related knowledge in the areas of IMS, TSO and overall communications systems.

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Manager
Professional Recruiting
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EOE M/F

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To participate, you MUST register. Call Cybersearch any weekday 9 A.M. to 7 P.M. Out-of-towners call collect. For reasons of confidentiality, if your current employer is an attending company, we will notify you immediately.

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We are looking for a senior-level programmer to lead a team of analysts working on enhancement and support of common OS modules, such as assembler and loaders. Knowledge of the CDC assembly language, COMPASS, is essential.

An experienced Programmer with a working knowledge of FORTRAN and COBOL from one dialect to another. Candidate must have the ability to work with a high degree of independence.

Software Technical Writers

Begin your career in technical writing, or allow us to make use of your experience in our technically challenging environment, documenting state-of-the-art software for the world's leading large-scale computer systems. You will be involved in preparing user manuals supporting CDC's software product line, including ALGOL, FORTRAN, PL-1 and data management languages. Ideal candidate will have BS degree in Computer Science with some writing experience, or a combination of equivalent skills/education.

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Participate in the design, implementation and maintenance on a variety of data management projects including new features in the data description language and the data base access product. A working knowledge of block structured languages is required. Familiarity with an assembly language is highly desirable.

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Provide development and continuation support for the STAR computer. Candidates will develop and maintain code written in a higher-level language for the STAR-100 computer. Knowledge of OS, FORTRAN and assembly languages is desirable.

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If you are ready to work with the best talent and technology the industry has to offer, take advantage of these opportunities now. We provide excellent compensation and comprehensive benefits, including dental and retirement plans. Qualified candidates are invited to send resumes in confidence to Karen Hardy, Dept. 50-A, 215 Moffett Park Drive, Sunnyvale, CA 94086

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Motorola provides progressive salary and benefits programs. Please send resume to:

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Individuals with substantial project management experience. Must possess application software knowledge in manufacturing and accounting systems, and skill in customer/client relationships. These candidates will be accountable for full implementation activities as well as cost and schedule performance

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Will function as system network coordinator and internal technical consultant to application software staff. Requires demonstrated programming experience to include systems programming. Experienced in HP-3000 operating systems software including DBMS and DS.

SR. SYSTEMS ANALYSTS

These individuals will be responsible for application software implementation at division and subsidiary locations. Heavy manufacturing/accounting knowledge is required. Prior experience in software installation is desired.

SR. PROGRAMMERS

Minimum of four years COBOL programming experience preferably in order entry and/or standard cost applications. These individuals will be assigned to major developmental work, and subsequently assist in installation of the systems throughout the company.

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Growth company seeks individual with min. 3 years experience & proven problem solving ability from design through implementation. 3 years experience on IBM 370 equipment required. Language - COBOL under DOS/VS. Additional desirable experinece includes RPG, CICS, DL/1, SPMOL, & TP. Salary commensurate with experience & ability. Superior, fully paid benefit package. Send full resume including salary history and requirements to Personnel Manager, P.O. Box 1502, Savannah, Ga. 31402. Equal Opportunity Employer Male/Female.

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We are seeking a key individual capable of assuming project management responsibility for the development and implementation of an On-Line Purchasing Application, as well as other manufacturing applications.

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Sr. Systems Analyst - MBA, with IMS experience, Mfg., Cost acct., Bill of Materials. To $23K.
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DP Manager - Want heavyweight, Gets V.P. fringes, strong in languages. Good management background. Requires some travel. $30 to $35K.

These are sample listings. We have many, many more, particularly in the PROGRAMMER/ANALYST AREA with good companies and good locations. Agency fee, interview & relocation expenses assumed by client companies.

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Senior Analyst/Programmer
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Maintain ACP realtime software; evaluate new support requirements/enhancements, develop modifications; minimum of 8 years, ACP internals; working knowledge of the following areas are required: 2305/3340 I/O handling, Tape I/O handling, Hypervisor, VMA support, Capture/Restore, Test vehicle support, System initialization, and ACP generation.

For both positions, prefer experience with ACP Release 8.1 and beyond; and IBM 370/168 hardware. Familiarity with SVS in a PARS support role is a plus; Bachelors degree in Mathematics, Computer Science, Engineering required.

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Send resume to: Personnel Coordinator, P.O. Box 2218, Redding, California 96001.

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Automated Data Processing Division, the computer center for New Mexico state government, has openings in the following areas:

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For further information contact
Gene A. Veldes, Personnel Administrator, Room 427, State Capital Building, Santa Fe, New Mexico 87503. (Telephone (505) 827-2601 or 827-2948).

The State of New Mexico is an equal opportunity/affirmative action employer.

SYSTEM PROGRAMMER

(OS/VS1)

We have an immediate need for an experienced System Programmer to complete our system technical services staff. Currently we are operating a 138 running under VM/370 and DOS/VS. We are planning an upgrade to a 3031 and adding OS/VS1. Successful candidate must have the ability to assist in this upgrade and to generate OS/VS1. You will also be responsible for OS/VS1 training.

If you have OS/VS1 sysgen experience and have the desire to enjoy the beauty and recreational opportunities that Montana has to offer, send your resume or call COLLECT to: Mr. Ed Wadsworth, The Anaconda Company, Butte, Montana 59701, Phone (406) 723-4311 Ext. 356.

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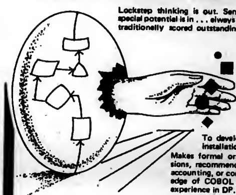

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To develop and modify DP systems; define and supervise installation procedures. Evaluate OS and improvements. Makes formal oral and written presentations of findings, conclusions, recommendations. Needs Bachelor's degree (statistics, math, accounting, or computer science major) with MBA desirable. Knowledge of COBOL & CICS. Minimum 6 years experience including experience in DP.

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Responsible for systems design flow and test segments, must be able to translate SA requirements into feasible design. Will write complete programs specifications including flow charts showing systems linkage, data movement and resource requirements. Will also design file structures, forms, reports, and procedures for data collection, processing and control. Needs 2-4 years college plus minimum 4 years experience in programming and systems.

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The Department's budget of ten million dollars will include a staff over over 200, two 370/158's and a 370/155 serving more than 600 terminals in eight Bay Area counties. Distributed equipment will incude twelve minicomputers, and more installations are planned.

Alameda County is located in a lively, beautiful, varied area of great culture, climate, history and dynamic change. It encompasses thirteen cities, including Berkeley, site of the University of California.

To meet the challenge of this position, the Director of the Information Services Department must have strength, intelligence and a flexible, innovative approach; be a good listener and an articulate, dynamic communicator; display and inspire trust; have a broad management background including data processing; work effectively in County government; understand current issues and future trends of this technical field; have a service philosophy and be able to instill it in others; be able to attract, select, and retain quality personnel; and be committed to affirmative action.

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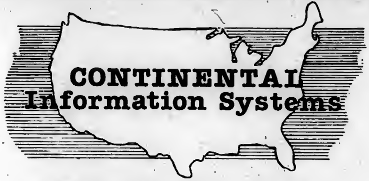

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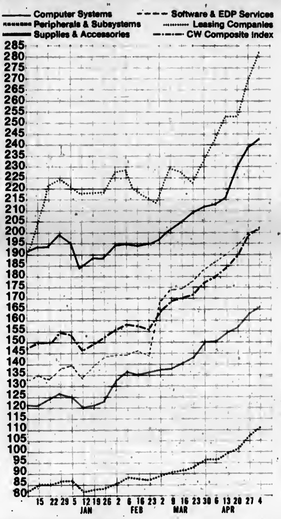

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Earnings	314,887	309,767

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Three Months Ended March 31

	1978	R1977
Shr Ernd	$ 83	$ 60
Revenue	556,120,000	515,267,000
Earnings	22,869,000	16,080,000

R-Restated to reflect accounting change

TRANSAMERICA
Three Months Ended March 31

	1978	1977
Shr Ernd	$ 69	$ 51
Revenue	830,700,000	742,564,000
Earnings	46,135,000	34,353,000

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Three Months Ended March 31

	1978	1977
Shr Ernd	$1 17	$1 30
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Earnings	8,583,000	10,183,000

APPLIED MAGNETICS
Three Months Ended March 31

	1978	1977
Shr Ernd	$ 21	
Revenue	21,810,000	$17,299,000
Tax Cred	208,000	
Earnings	666,000	(712,000)
6 Mo Shr	.29	
Revenue	40,216,000	31,262,000
Tax Cred	208,000	
Earnings	1,229,000	(836,000)

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	1978	a1977
Shr Ernd	$ 48	$ 41
Revenue	77,092,000	64,056,000
Earnings	7,165,000	6,055,000
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Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, MAY 5, 1978

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EXCH		1977-78 RANGE (1)	CLOSE MAY 3 1978	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMDAHL CORP	22- 56	55 3/8	+ 7/8	+1.6
N	BURROUGHS CORP	55- 91	68	-1 7/8	-2.6
O	COMPUTER AUTOMATION	18- 50	29 3/4	+1 1/4	+4.5
N	CONTROL DATA CORP	20- 51	50 1/4	+1 1/2	+5.2
O	CRAY RESEARCH INC	15- 42	41 1/2	+5 5/4	+9.9
N	DATA GENERAL CORP	35- 55	52 5/4	+ 3/4	+1.4
N	DATAPOINT CORP	18- 50	49 1/8	+1 7/8	+3.9
N	DIGITAL EQUIPMENT	37- 55	44 5/4	+1 1/2	+3.4
N	ELECTRONIC ASSOC.	2- 5	5 1/8	+ 1/4	+5.1
A	ELECTRONIC ENGINEER.	8- 17	16 7/8	+ 1/8	+0.7
O	FOUR-PHASE SYSTEMS	15- 28	27 1/8	+2 1/8	+8.5
N	FORBORO	28- 54	35 1/8	-2 5/4	-7.6
O	GENERAL AUTOMATION	6- 10	9 1/8	- 3/4	-7.5
O	GRI COMPUTER CORP	1- 1	1 1/8	0	0.0
N	HEWLETT-PACKARD CO	62- 87	75	- 1/8	-0.1
N	HONEYWELL INC	45- 55	50 7/8	+ 1/8	+0.2
N	IBM	236-286	263 1/4	+ 7/8	+0.5
O	MANAGEMENT ASSIST	5- 15	14 5/4	0	0.0
O	MICRODATA CORP	7- 18	12 1/8	+ 1/2	+4.5
O	MINI-COMPUTER SYST	5- 12	5 3/4	0	0.0
O	MODULAR COMPUTER SYS	5- 13	12 5/4	+1 1/8	+9.6
N	NCR	52- 52	50	0	0.0
O	PRIME COMPUTER INC	12- 38	37 5/8	+ 5/8	+1.7
N	PERKIN-ELMER	17- 22	19 1/8	-1	-4.9
N	RAYTHEON CO	16- 42	40 5/8	-1 1/4	-3.0
N	SPERRY RAND	50- 42	59 1/4	- 1/4	-0.6
O	SYCOR INC	8- 25	22 7/8	+ 3/8	+1.6
A	SYSTEMS ENG. LABS	5- 16	15 1/2	+1	+6.8
A	WANG LABS.	10- 20	18 1/2	- 1/8	-0.6

LEASING COMPANIES

EXCH		1977-78 RANGE (1)	CLOSE MAY 3 1978	WEEK NET CHNGE	WEEK PCT CHNGE
C	ALANTHUS CORP	3- 6	5 7/8	0	0.0
C	BOOTHE COURIER CORP	8- 16	16 5/8	0	0.0
O	COMDISCO INC	9- 17	16 1/4	+ 1/4	+1.5
A	COMMERCE GROUP CORP	1- 3	7/8	0	0.0
A	COMPUTER INVSTRS GRP	1- 2	1 1/8	+ 1/4	+28.5
N	DATRONIC RENTAL	0- 2	1 5/8	0	0.0
A	DCL INC	1- 4	3	+ 1/4	+9.0
N	DPF INC	6- 11	11	+1 1/8	+11.5
N	ITEL	13- 24	25 1/4	+1 1/2	+6.8
N	LEASCO CORP	19- 34	52 3/4	- 1/4	-0.7
O	LEASPAC CORP	1- 2	1 5/4	0	0.0
O	PIONEER TEX CORP	5- 11	5 5/8	- 1/4	-4.2
N	U.S. LEASING	10- 16	15 1/8	+1	+7.0

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

EXCH		1977-78 RANGE (1)	CLOSE MAY 5 1978	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	0- 2	1	0	0.0
O	AMACOMP INC	7- 12	11 1/4	0	0.0
A	APPLIED DATA RES.	5- 15	11	-1 1/2	-12.0
N	AUTOMATIC DATA PROC	25- 30	29 1/2	- 1/4	-0.8
O	COLEMAN AMERICAN COS	1- 2	1 1/2	+ 1/8	+9.0
O	COMPU-SERV NETWORK	7- 15	7 1/2	0	0.0
O	COMP ELECTION SYSTMS	6- 10	9	0	0.0
C	COMPUTER HORIZONS	1- 2	2 1/4	0	0.0
C	COMPUTER NETWORK	6- 11	9 7/8	+ 5/8	+3.9
N	COMPUTER SCIENCES	7- 12	11 1/8	- 1/2	-4.5
C	COMPUTER TASK GROUP	1- 2	2 5/4	+ 1/2	+22.2
O	COMPUTER USAGE	1- 5	5 5/8	+ 3/4	+28.5
C	CONSHARE	5- 12	11 1/2	+1	+9.5
O	DATA DIMENSIONS INC	5- 5	5 5/8	- 5/8	-14.7
O	DATATAB	1- 2	1 1/4	0	0.0
N	ELECTRONIC DATA SYS.	14- 20	19	+ 7/8	+4.8
O	INSYTE CORP	2- 3	1 3/8	- 1/8	-8.3
C	IPS COMPUTER MARKET.	1- 2	2 1/4	0	0.0
O	KEANE ASSOCIATES	5- 4	3 1/2	- 1/4	-6.6
C	KEYDATA CORP	1- 5	2	- 1/8	-5.8
A	LOGICON	7- 17	15 1/8	+ 5/8	+2.9
A	MANAGEMENT DATA	1- 2	1 1/8	- 1/8	-10.0
A	NATIONAL CSS INC	10- 22	22	+2	+10.0
O	NATIONAL DATA CORP	4- 12	11 1/4	+ 3/4	+7.1
A	ON LINE SYSTEMS INC	16- 24	22	+ 5/8	+2.9
N	PLANNING RESEARCH	3- 6	5 1/4	+ 3/8	+7.6
O	PROGRAMMING & SYS	1- 1	3/4	0	0.0
O	RAPIDATA INC	2- 5	4 1/2	0	0.0
O	REYNOLDS & REYNOLD	17- 25	25 1/2	- 1/2	-2.0
O	SCIENTIFIC COMPUTERS	1- 4	5 1/4	+ 3/8	+7.6
O	TYMSHARE INC	14- 23	22	+ 5/8	+1.7
A	URS SYSTEMS	4- 6	5 3/4	- 1/4	-4.1
M	WYLY CORP	1- 5	4	- 3/8	-8.5

PERIPHERALS & SUBSYSTEMS

EXCH		1977-78 RANGE (1)	CLOSE MAY 5 1978	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	10- 20	18 1/2	+ 1/8	+0.6
O	ADVANCED MEMORY SYS	7- 12	11 3/4	- 1/8	-1.0
N	AMPEX CORP	8- 15	14 5/8	+ 3/8	+2.6
O	ANDERSON JACOBSON	3- 8	7 7/8	+1 5/8	+21.1
N	APPLIED DIG DATA SYS	10- 20	13 7/8	- 1/2	-3.4
O	BEEHIVE INT'L	5- 12	5 5/8	+ 1/4	+4.6
A	BOLT,BERANEK & NEW	6- 9	8	+ 3/4	+10.3
N	BUNKER-RAMO	8- 17	16	+1 3/8	+9.4
A	CALCOMP	3- 7	7	+ 5/4	+12.0
O	CAMBRIDGE MEMORIES	1- 5	4 5/8	+ 7/8	+23.3
N	CENTRONICS DATA COMP	16- 30	22	+3	+15.7
C	COGNITRONICS	1- 1	3/4	0	0.0
O	COMPUTER COMMUN.	5- 8	8 5/8	-1	-10.3
O	COMPUTER CONSOLES	4- 7	6	0	0.0
A	COMPUTER EQUIPMENT	2- 5	4 1/2	- 1/4	-5.2
O	COMPUTER TRANSCEIVER	1- 1	1 3/8	0	0.0
O	COMTEN	9- 21	20 3/4	+2	+10.6
N	CONRAC CORP	19- 28	23 1/8	+2	+9.4

EXCH		1977-78 RANGE (1)	CLOSE MAY 3 1978	WEEK NET CHNGE	WEEK PCT CHNGE
O	DATA ACCESS SYSTEMS	4- 5	4 1/2	0	0.0
O	DATA 100	6- 16	15 1/2	+1	+6.8
A	DATA PRODUCTS CORP	9- 20	18 5/4	- 1/8	-0.6
O	DATA TECHNOLOGY	3- 4	4	0	0.0
O	DATUM INC	1- 4	3 7/8	0	0.0
O	DECISION DATA COMPUT	2- 5	1 5/8	- 1/8	-7.1
O	DELTA DATA SYSTEMS	1- 1	1/4	0	0.0
A	DOCUMATION INC	6- 16	15 5/8	+ 3/4	+5.1
O	DATARAM CORP	2- 24	19 1/4	- 3/4	-5.7
N	ELECTRONIC M.& M	4- 6	5 1/2	+ 1/8	+2.3
O	FABRI-TEK	1- 2	1 1/2	+ 1/2	+50.0
O	GENERAL COMPUTER SYS	0- 2	1 1/8	- 1/8	-10.0
N	HAZELTINE CORP	8- 15	15 5/8	+ 3/8	+2.8
N	HARRIS CORP	28- 54	50 3/4	-2 5/4	-5.1
O	INFOREX INC	4- 9	8 5/8	+1 1/8	+15.0
C	INFORMATION INTL INC	8- 14	9 1/2	- 1/4	-2.5
O	INTEL CORP	38- 57	51 1/2	+ 1/2	+0.9
A	LUNDY ELECTRONICS	3- 6	4	0	0.0
O	MSI DATA CORP	6- 15	15 1/4	+ 1/4	+1.6
N	MEMOREX	23- 43	41 5/4	+3 1/8	+8.0
N	MOHAWK DATA SCI	5- 10	10	+1 1/8	+12.6
O	PENRIL CORP	2- 8	7 1/2	+ 1/4	+5.4
N	PERTEC CORP	7- 15	12 3/4	+1	+8.5
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISION INST.	2- 2	2	0	0.0
O	QUANTOR CORP	3- 5	5 5/8	0	0.0
O	RECOGNITION EQUIP	6- 10	8 5/4	+1	+12.9
O	SCAN DATA	1- 5	2 1/2	+	+2.5
O	STORAGE TECHNOLOGY	10- 38	37 3/4	+4 5/8	+13.9
O	T BAR INC	7- 19	17 1/2	+ 1/2	+2.9
C	TALLY CORP.	4- 9	9	+ 1/8	+1.4
A	TEC INC	6- 10	8	0	0.0
M	TEKTRONIX INC	29- 41	41 1/8	+ 1/8	+0.3
N	TELEX	2- 5	4 5/8	- 3/4	-13.9
O	TESDATA SYSTEMS CP	15- 20	16 1/4	0	0.0
O	WILTEK INC	1- 1	1/2	0	0.0

SUPPLIES & ACCESSORIES

EXCH		1977-78 RANGE (1)	CLOSE MAY 3 1978	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMERICAN BUS PRODS	6- 9	8 1/4	0	0.0
O	BALTIMORE BUS FORMS	1- 4	3 1/4	0	0.0
A	BARRY WRIGHT	10- 21	21 1/4	+ 3/8	+1.7
O	CYBERMATICS INC	1- 1	1	+ 1/8	+14.2
C	DUPLEX PRODUCTS INC	14- 21	20 1/4	- 1/4	-1.2
N	ENNIS BUS. FORMS	6- 12	12 1/4	+ 1/4	+2.0
N	3M COMPANY	43- 58	50 5/4	- 1/4	-0.4
C	MOORE CORP LTD	24- 37	28 3/4	- 3/4	-2.5
N	NASHUA CORP	16- 29	28 5/8	+1 3/8	+5.0
O	STANDARD REGISTER	18- 26	25 1/4	- 1/4	-0.9
O	TAB PRODUCTS CO	8- 19	12	+1 1/8	+10.3
N	UARCO	18- 24	24 1/4	+ 1/8	+0.8
A	WABASH MAGNETICS	10- 15	12	- 1/4	-2.0
N	WALLACE BUS FORMS	17- 23	22 3/4	- 1/4	-1.0

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